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VOLUME 4, NUMBER 3, MARCH 1973.
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Air Pollution Technical Information Center
Research Triangle Park, North Carolina

March 1973

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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. The subject index consists of those terms that most clearly describe the information presented in the documents. The author index consists of personal authors which are arranged alphabetically. This issue contains abstracts 25768-26243.

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Research Triangle Park, North Carolina 27711

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Author Index AI-1

Personal authors are arranged alphabetically. The names are presented last name first. When the author is a primary author an asterisk precedes the Abstract Number.

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INTRODUCTION

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This periodical is intended to inform personnel of the Environmental Protection Agency (EPA), and others who are also professionally interested in air pollution, of selected technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given.

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As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of the lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching ---more than those included in the subject index in each issue.

Feedback from our users, including suggestions of articles for abstracting, are always welcome.

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APTIC Publications

Odors and Air Pollution: A Bibliography with Abstracts, October 1972, GPO No. EP 4.9:113, $3.00.

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Air Pollution Aspects of Emission Sources: Petroleum Refineries - A Bibliography With Abstracts, July 1972, GPO No. EP 4.9:110, $1.25.

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Photochemical Oxidants and Air Pollution: An Annotated Bibliography (2 Volumes), March 1971, GPO No. EP 4.9:88, $6.25.

Beryllium and Air Pollution: An Annotated Bibliography, February 1971, GPO No. EP 4.9:83, $0.40.

Asbestos and Air Pollution: An Annotated Bibliography, February 1971, GPO No. EP 4.9:82, $0.50.

Municipal Incineration: A Review of Literature, June 1971, GPO No. EP 4.9:79, $1.00.

Hydrocarbons and Air Pollution: An Annotated Bibliography (2 Volumes), October 1970, GPO No. HE 20.1309:75, $5.00.

Nitrogen Oxides: An Annotated Bibliography, August 1970, GPO No. HE 20.1309:72, $2.75.

Air Pollution Translations: A Bibliography With Abstracts Volume I, May 1969, GPO No. FS 2.93/3:56, $1.75.

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Contract No. 68-02-0742.. *$69,113*
INVESTIGATION OF EXTRACTIVE SAMPLING INTERFACE PARAMETERS.
Walden Research Corporation, 359 Allston Street, Cambridge, Massachusetts 02139

Contract No. 68-02-1067, RFP No. Du-72-A111 .... *$37,670*
DEVELOPING A METHODOLOGY FOR ESTIMATING ANNUAL CONSUMPTION OF LIQUID FOSSIL FUELS ON A COUNTY BASIS.
Walden Research Corporation, 359 Allston Street, Cambridge, Massachusetts 02139

Contract No. 68-02-0329, Modification No. 4.. *$42,000*
STUDY OF EFFECTS OF LOW LEVELS OF CARBON MONOXIDE ON HUMANS PERFORMING DRIVING TASKS.
Ohio State University, 1314 Kinnear Road, Columbus, Ohio 43212

Contract No. 68-02-0339, Modification No. 1.. *$44,969*
EVALUATION OF THE SAI PHOTOCHEMICAL DIFFUSION SIMULATION MODEL.
Systems Applications, Inc., 9418 Wilshire Boulevard, Beverly Hills, California 90212

Contract No. 68-02-0713.. *$59,600*
STUDY OF THE USE OF LEUCOCYTE METABOLISM AS A HEALTH EFFECTS INDICATOR.
Stanford Research Institute, 333 Ravenswood Avenue, Menlo Park, California 94025

Contract No. 68-02-0717, RFP No. Du-73-B285 .... *$85,000*
COMMUNITY STUDIES TO PROVIDE DATA ON THE EFFECTS OF PESTICIDES USE ON PUBLIC HEALTH.
State of Florida Division of Health, Box 210, Jacksonville, Florida 32201

Contract No. 68-02-1011, RFP No. Du-73-A092.. *$35,704*
DEVELOPMENT AND TESTING OF AN AIR MONITORING SYSTEM.
Research Triangle Institute, P. O. Box 12194, Research Triangle Park, N. C. 27709

Contract No. 68-02-1003, Task Order No. 2 .... *$8,000*
NATIONWIDE EMISSION INVENTORY OF POINT SOURCES.
Environmental Engineering, Inc., 2324 S.W. 34th Street, Gainesville, Florida 32601

Contract No. 68-02-0707, RFP No. Du-73-B284 .... *$44,568*
COMMUNITY STUDIES TO PROVIDE DATA ON THE EFFECTS OF PESTICIDES USE ON PUBLIC HEALTH.
Oklahoma State Department of Health, 3400 N. Eastern, Oklahoma City, Oklahoma 73105

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Contract No. 68-02-1003, Task Order No. 1 .... *$30,000*
NATIONWIDE EMISSION INVENTORY OF POINT SOURCES.
Environmental Engineering, Inc., 2324 S.W. 34th Street, Gainesville, Florida 32601

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SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry--e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS--HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

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8. EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

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ABSTRACT BULLETIN

EMISSION SOURCES

1972

25768 **APTIC NO. 47371**

NATURAL GAS FUEL-CELL UNITS PRODUCE ON-SITE ELECTRICITY. *Can. Petrol., 13(9):17-18, Sept. 1972. 2 refs.*

The Team to Advance Research for Gas Energy Transformation (TARGET) was formed in 1967 as a non-profit research program with the objective of studying the possibility of using natural gas fuel cells in the on-site production of electricity for commercial, residential, and industrial use. A working prototype suitable for residential applications, capable of delivering about 12 and 1/2 kWhr, was developed and an extensive field testing program is currently underway. The distribution cost of natural gas can be as low as 1/5 the cost of distributing the same amount of energy in the form of electricity. The production of electricity using fuel cells is not much more efficient than at a well-designed modern thermal generating station, but there is one very important difference: the fuel cell can reach this efficiency at relatively low power while the thermal generating station has to be large to be economical. Other advantages of natural gas are cited, and efficiency of the fuel cell is discussed. While the complete installation is referred to as a fuel cell, the power plant actually consists of three separate parts. The incoming gas is fed to a reformer in which the methane is cracked in the presence of steam and a suitable catalyst to form carbon dioxide and hydrogen. This mixture is passed on to the fuel cell itself where the reaction between the hydrogen and atmospheric oxygen produces electricity. Costs are considered, as well as advantages for the environment.

25769 **APTIC NO. 47390**

EXTERNAL COMBUSTION ENGINE WORKS AIR THROUGH SEALED LOOP. *Automotive Eng., 80(9):58-62, Sept. 1972.*

By replacing the intermittent flow of the Stirling cycle with steady flow in the heat exchangers, the external combustion piston engine can use ordinary air as the working fluid. Basically, the external combustion piston engine operates on a four-stroke cycle. Compression and expansion take place inside the cylinder while heating and cooling proceed in external heat exchangers. The thermodynamic cycle consists of two loops. One is open and contains the burner. Its combustion products heat the working fluid in the second, closed loop. In turn, the working fluid heats the combustion air through the waste heat exchanger. How the cycle works is described, as well as controlling power, operating parameters, combustion effects, and performance calculations. Development of a Rankine cycle engine at Steam Engine Systems Corp., Watertown, Massachusetts, is outlined, and the use of water-pyridine as a working fluid is considered.

25770 **APTIC NO. 47411**

PLASTICS IN THR REFUSE REMOVAL (Kunststoffe in der Muellbeseitigung). Text in German. Plastverarbeiter, 23(8):591- 593, Aug. 1972. 4 refs.

About 20% of the total refuse is incinerated, 15% is disposed of in sanitary landfills, and 63% is dumped. The most effective but most expensive method of refuse removal is incineration which takes place in about 40 incineration plants throughout the Federal Republic of Germany. The problem of plastic in the refuse is not as important as it may seem. The main part of the plastic material consists of polyethylene, polyproplyene, and polystyrol which form harmless carbon dioxide and water vapor when burned. A small part of the plastic refuse consists of polyvinyl chloride which develops gaseous hydrochloric acid when incinerated. Even the incineration of refuse containing 5% PVC does not cause any corrosion in the incineration plants nor is a health hazard. A great part of the HCl gas is bound to the ashes in the refuse. The actual PVC concentration in the refuse amounts to 0.2 to 0.6% of the total refuse quantity, while a concentration up to 2% is considered to be harmless.

25771 **APTIC NO. 47604**

IS COAL-IN-OIL CONCEPT MORE THAN A PIPE-DREAM? Can. Petrol., 13(9):24-25, Sept. 1972.

Using only existing technology, the light-ends were skimmed from crude oil and made up in an oil/pulverized coal blend in the ratio of 65:35. The coal had a low sulfur content and a low density, and the result was a clean burning fuel, readily adaptable to existing fuel burner systems. The mixture has a greater heat content per unit volume than either the coal or oil from which it is made. It may be moved by pipeline at about half the cost of transporting coal by rail, and it might provide a suitable end-use for presently rejected coal fines from mines in western Canada. It can be pumped and stored like oil, and the coal-in-oil suspension makes better use of storage space than coal alone. Disadvantages, financing problems, and government interest in the project are considered.

25772 **APTIC NO. 47609**

Japan Environmental Agency, Tokyo, Bureau of Air Quality

REPORT ON THE INVESTIGATION OF THE TOTAL AMOUNT OF AIR POLLUTANTS AND THEIR ORIGINS. SEPTEMBER 1972. *(Taiki osen busshitsu hasseigen betsu haishutsu soryo chosa hokoku). Text in Japanese. Kankocho Kogaisenmon Shiryo (Public Nuisance Gaz.), 7(6):2-25, Dec. 1972. 6 refs.*

The amounts of carbon monoxide, hydrocarbons, and nitrogen oxides were investigated in the Tokyo Bay area in 1960, 1965, and 1970 and estimated for 1975. Automobiles, airplanes, power plants, the steel industry, domestic heating, solid waste disposal, petroleum refining, and organic solvent wastes are the major causes of pollution. The total amounts of CO, HC, and NOx were 462,000, 153,400, and 87,300 t/yr in 1960, respectively, and will be 1,270,600, 452,300, and 674,600 t/yr in 1975, respectively. The automobile produced 98% of the CO in 1960, however in 1975 the percentage will decrease to 85.2% and the balance will come from burning of refuse. About 51% of the HC has and will come from automobiles, and 25-27% has and will come from the evaporation of organic solvents. About 35-41% of the NOx has and will come from automobiles, the remainder from power plants and industry. Diffusion can change the amount of pollution in an area.

25773 **APTIC NO. 47642**

Japan National Living Center

THE PRESENT STATE AND PROBLEM OF THE COUNTERMEASURE PLAN ON POLLUTION (AN INTERIM

REPORT). (Kogai boshi keikaku no genjo to kadai (chukan hokoku)). Text in Japanese. 217p., March 1972.

The present state of pollution and control plans in three large industrial areas are given. During the first half year of 1971, the total expenditure from industries for pollution prevention in Chiba was approxomately $200 million of which up to 3/4 was for air pollution. The amounts of flue gas and sulfur oxides discharged in 1974 will be double that in 1969. In Mizushima, the consumption of heavy oil has increased about 3.4 times from 1967 to 1970 while the amount of SOx discharged has increased 2.35 times. However, measurement of SOx conducted in 1970 at 19 locations revealed that only location was disqualified. In Tokyo, air pollution mostly resulted from small-scale industries and building heating which accounted for 19% of the total SOx discharged. The total SOx doubled from 1964 to 1971, and is expected to increase more than 80% by 1980. Countermeasures included restriction of lead content in gasoline, and lowering of environmental standards are discussed.

25774 **APTIC NO. 47668**

LOW EXHAUST GAS EMISSIONS. NATURAL GAS DRIVE FOR INNER CITY TRAFFIC. *(Niedrige Abgasemissionen. Erdgasantrieb fuer den innerstaedtischen Verkehr). Text in German. Wasser Luft Betrieb, 16(11):396-397, 1972.*

A description of the Daimpler Benz city bus using a natural gas engine is given. The gas-driven engine operates according to the Otto-principle which means an electric ignition system and throttle regulation is used. Instead of a gasoline carburetor, a gas-air-mixer with a gas regulator is installed. The natural gas is carried in 72 pressurized bottles with a total volume of 579 l. At a pressure of 200 atm about 116 cu m of gas can be filled into the bottles. Compared to the conventional diesel operated bus, the natural gas driven bus weighs about 700 kg more. If the gas were carried in the liquid state the bus would weigh about 130 kg more. The pollutant emission by the natural gas engine was measured according to the California test. The hydrocarbon emission was 20% lower than the limit concentration for hydrocarbons of 5 g/BHPh which will go into effect in California in 1975; the same was true for the emission of the oxides of nitrogen; the emission of carbon monoxide was only 1/12 of the maximum allowable concentration. Despite the lower pollutant emission of the natural gas engine it will not be a serious competitor for the diesel engine for years to come, because the latter also has a low exhaust gas emission and allows a far more economical operation.

25775 **APTIC NO. 47542**

Allsup, J. R. and R. D. Fleming

EMISSION CHARACTERISTICS OF PROPANE AS AUTOMOTIVE FUEL. *Bureau of Mines, Bartlesville, Okla., Bartlesville Energy Research Center, Rept. of Investigations 7672, 38p., 1972. 4 refs.*

Air pollutants in exhaust gas produced by propane-fueled laboratory engines and vehicles were measured to evaluate engine parameters relating to the advantageous use of propane as a low pollution fuel. Propane as a fuel was compared with gasoline and natural gas. Engines fueled by propane operated over a wider range of air-fuel ratios with minimum carbon monoxide and hydrocarbon emissions than engines fueled by gasoline. Mixture enrichment using propane was unnecessary during cold starts, thereby eliminating the emission penalty during warm-up. Carbon monoxide and hydrocarbon emissions from propane-fueled engines were not affected by ambient temperature. The photochemical reactivity of hydrocarbon emissions was also considerably lower with propane than with gasoline. (Author abstract modified)

25776 **APTIC NO. 47447**

Amaniya, Tomizo and Hiroo Chiba

AROMATIC HYDROCARBON TECHNOLOGY IN THE FUTURE. *(Hokozoku tanka suiso gijutsu no shorai). Text in Japanese. Aromatikkusu (Aromatics), 24(2):61-71 and 79, 1972. 17 refs.*

In order to meet the increasing demand for aromatic hydrocarbons in high octane gasoline, various catalytic improvement methods are being developed. Catalytic platforming, catalytic cracking, thermal cracking, hydrogenation dealkylization, alkylization, octafining, isoforming, extraction-distillation (distapex), adsorption cracking, crystallization, and other manufacturing methods for aromatic hydrocarbons such as direct oxidation of benzene, the use of oxidation additives, special resin, linear polymer, and bacteria, are discussed. However, with the increase of consumption of aromatic hydrocarbon gasolines, the amount of hydrocarbons emitted is expected to increase greatly in the future. Methods for preventing air pollution are mentioned very briefly. The transformation of HC into nontoxic matter by changing the aromatic solvents, decreasing the amount of emission by adsorbing waste gas by activated carbon, or decomposing HC into nontoxic material by some sort of bacteria are possible control methods.

25777 **APTIC NO. 47696**

Balay, L.

PROPANE FUEL FOR MATERIAL HANDLING EQUIPMENT. *(Propane carburant pour chariots de manutention). Text in French. Tech. Moderne, 64(9):71, 73, Sept 1972.*

The use of propane fuel for material handling equipment such as fork-lifts in France is reviewed. The market for propane-fueled material handling equipment, 1300 units in 1971, is expanding at an annual rate of about 20%. The engine, the same as conventional gasoline engine, ensures increased mixture homogeneity and complete combustion, with harmful emissions practically absent as a result. The relatively high cost of propane is largely set off by prolonged engine life and reduced amount of maintenance. Material handling equipment can be provided with a 13-liter propane cylinder, or be equipped with a mounted tank for automatic fill-up. The exhaust carbon monoxide and hydrocarbons determined on a propane-fueled Renault engine according to the European cycle test were 11.3 g and 4.1 g, respectively.

25778 **APTIC NO. 47320**

Bernert, Juergen

METHOD OF DETERMINATION OF THE RELATIVE ODOR INTENSITY OF WASTE WATER TREATMENT PLANTS. *(Methode zur messtechnischen Bestimmung der relativen Geruchs-Intensitaet von Abwasserbehandlungsanlagen). Text in German. Wasser Luft Betrieb, 16(12):417-420, 1972. 19 refs.*

The odors emitted by a waste water purification plant were analyzed and the relative odor intensity was determined by taking and analyzing water samples at times of intense odor perception in the neighborhood. The waste water entering the purification plant first passed a rake for removal of coarse solid matter, a sand trap one or two Imhoff tanks, two enclosed packed columns, and two post purification basins. The water samples were taken from the Imhoff tanks. The pH value was determined electrometrically; the sedimenting substances were determined with an Imhoff funnel; the sulfides was measured by distillation of the sample in the presence of cadmium acetate followed by iodometric analysis. The total sulfur was determined by oxidation with bromine water and gravimetric measurement of the sulfate formed by precipitation with barium chloride. The dissolved organically bound carbon, the alkaline substances, and ammonia were also determined. Odors came mostly from hydrogen sulfide which formed from the sulfur compounds present in the water samples. The samples contained between 1.4 and 2.2 mg/l and 10.7 to 11.2 mg/l sulfide. The pH value in these two samples was less than seven. They also contained a relatively high ammonium content. The odor tolerance level was far exceeded.

25779 **APTIC NO. 47305**

Besse

NATURAL GAS: A NONPOLLUTING FUEL. *(Le gaz naturel: un combustible non polluant). Text in French. Colloq. Int. Homme, Air Eau, Paris, France, 1972, 6p. (June.)*

The advantages of natural gas used as a nonpolluting fuel for homes, industries, and automobiles are reviewed. Natural gas, whether in its original state, or desulfurized at acceptable costs, contains practically no sulfur, allows optimum combustion control, and emits much fewer nitrogen oxides than any other fuel. The limited pollutant discharge permits considerable reduction of the necessary stack height. Natural gas-fueled automobiles, requiring minor modifications of the engine, emit much less carbon monoxide and hydrocarbons than conventional ones. The number of natural gas-driven automobiles in the U. S., using this fuel mostly in compressed form, is expected to increase from 200,000 to some one million.

25780 **APTIC NO. 47374**

Bresler, Sidney A. and John D. Ireland

SUBSTITUTE NATURAL GAS: PROCESSES, EQUIPMENT, COSTS. *Chem. Eng., 79(23):94-108, Oct. 16, 1972. 32 refs.*

An attempt is made to present the whole substitute or synthetic natural gas (SNG) picture: the processes, equipment, and economics involved in producing SNG from hydrocarbon liquids and from coal. To more fully appreciate the technology involved, SNG s role in the overall energy situation--and the natural gas shortage in particular--is first considered. An estimate is made of what the energy balance will be in 1985, and challenges facing the construction of SNG plants are mentioned. Synthetic or substitute natural gas is a material that can be interchanged with natural gas. It consists essentially of methane, and has a gross or higher heating value of approximately 1000 Btu/cu ft. Interchangeability, heating value, higher hydrocarbons, and impurities should be considered when reviewing the suitability of a proposed SNG situation. Raw materials, oil and coal reserves, other hydrocarbon resources, and basic process considerations are discussed. The SNG from naptha and liquefied petroleum gas (LPG) is also described. Desulfurization, catalytic gasification, methanation, and purification are outlined, in addition to processes for manufacturing SNG from crude oil and coal. The fluidized bed hydrogenator, partial oxidation, and modified refinery operations are included for production of SNG from crude oil; basic process alternatives, gas treatment, gasifier design, oxygen-addition, hydrogen-addition, and heat-carrier methods are included for production of SNG from coal. Costs are considered.

25781 **APTIC NO. 47717**

Clark, Wilson

HYDROGEN MAY EMERGE AS THE MASTER FUEL TO POWER A CLEAN-AIR FUTURE. *Smithsonian, 3(5):12-19, Aug. 1972.*

Adaptations of standard internal combustion engines to run on hydrogen are described. Performane was quite satisfactory, and oxides of nitrogen which were the only undesirable emission were at levels lower than those of a gasoline engine. One research project involved a fuel system based on liquid hydrogen and liquid oxygen storage, with gaseous mixing to the engine. The fuels are stored in special vacuum thermos bottles, or dewars, which keep them supercold at -400 F. The engine is modified to burn a rich hydrogen-to-oxygen mixture and its only exhaust emission, water vapor, is collected and recycled as an engine coolant. The storage and production of hydrogen are discussed. The simple and most common method of hydrogen storage is as a gas under pressure, but a lighter, more compact means is as a supercold liquid. While hydrogen can be produced from water by electrolysis, one long range possibility would be the use of solar radiation to power machines which would break water into hydrogen and oxygen.

25782 **APTIC NO. 47726**

Davies, Roger

WHERE HAVE ALL THE METALS GONE? Water Pollution Control (Toronto), 110(8):19, 26-29, Aug. 1972. 6 refs.

The need to know stack emissions if municipalities turn to incineration for their sludge disposal is stressed. The cadmium, and to a lesser extent, the lead levels, in sludges are likely to cause the most alarm. Health effects of cadmium are mentioned, and it is suggested that this metal is stored inside human body cells bound to protein. Fatal levels for cadmium and the ability of vegetables to absorb cadmium and lead are indicated. The current maximum safety level for cadmium is tentatively set at 0.5 ppm for food and 0.10 ppm for water. A survey was conducted of Canadian municipalities with heavy metals in their sludges to learn their methods of dealing with the problem. The Director of Water Pollution Control in metropolitan Toronto plans the analysis of sludge prior to incineration and after, to obtain data on what is emitted to the atmosphere. The problems which exist in Toronto and the other cities which predominantly use the sludge for landfills are indicated.

25783 **APTIC NO. 47727**

Foerg, Wolfgang and Volker Etzbach

NATURAL-GAS LIQUEFACTION. *Chem. Economy Eng. Rev., 4(8):28-36, Aug. 1972. 19 refs.*

The storage and transport of liquefied natural gas are discussed. A liquid storage tank of the same cubic capacity as a normal pressure gasholder can store almost 600 times as much latent energy, which is why natural gas liquefaction plants are so important for peak shaving. Insulated tanks are preferable to the frozen ground storage tanks with their appreciably greater evaporation losses. Use of liquefied natural gas and, in particular, methane for motor vehicles and as a fuel for gas turbine aircraft drives is indicated. Different processes historically used for the liquefaction of gases are listed. The Carnot cycle process is often used as a criterion for estimating the power consumption efficiency of a liquefaction process. Improvements in the Linde and the Claude processes are described. The Linde high pressure process with pre-cooling cycle, the classical cascade process, the closed cascade cycle with mixed refrigerants, the open cascade cycle used in conjunction with mixed refrigerants, the expander process, and the Stirling process are discussed. Natural gas liquefaction plants completed and still under construction are listed. Power supplies for large scale liquefaction plants for power stations and for peak-shaving plants are indicated.

25784 **APTIC NO. 47621**

Haemmerli, H.

THE INCINERATOR OLTEN: CAPACITY INCREASE BY SLUDGE DRYING. *(Muellverbrennung Olten: Leistungssteigerung durch Schlammtrocknung). Text in German. Muell Abfall, 4(5):163- 168, 1972. 1 ref.*

The capacity of the new incinerator Olten was much higher with a connected sludge drier than without (7.2 t/hr compared with 4.3 t/hr without sludge drier). This high capacity difference was directly connected to waste gas recirculation. The incinerator had a somewhat larger than normal combustion chamber. The main combustion took place above an underfed forward stoking grate. The primary air supplied to the combustion chamber was not enough for complete combustion (13,000 cu m/hr) so that an afterburning process is required.

From the afterburner, the flue gases got to a scrubber and then into the open air. A thermostate above the grate controls the underfed air independently of the temperature. Another thermostate controls the overfed air which is presented into the afterburning chamber so that the maximum allowable temperature of 1050 C is never exceeded. With a connected sludge drier, part of the flue gases from the afterburner are branched off and passed through the sludge drier. This cools the gases down to 250 C. For odor elimination, the cooled flue gases which are now mixed with water vapor are returned to the main combustion process. The dust emission of the combined incinerator and sludge drier, measured according to the VDI guidelines, was 210 mg/cu m at a carbon dioxide concentration of 7%.

25785 **APTIC NO. 47722**

Hauschildt, H. and G. Goritza

INFLUENCE OF THE FUEL OIL-EL-QUALITY ON THE OPERATION OF BURNERS WITH HIGH PRESSURE ATOMIZATION. *(Einfluss der Heizoel-El- Qualitaet auf den Betrieb von Hochdruckzerstaeubungsbrennern). Text in German. Oel Gasfeuerung, 17(10):798-808, 1972. 2 refs.*

In the Federal Republic of Germany fuel oil EL (extra light) varies in its composition due to the differing production processes. The influence of the changing quality of 18 fuel oils on the operation of four different burners with high pressure atomization was studied in a boiler whose combustion chamber had a diameter of 400 mm and a length of 2000 mm. The samples for determination of the waste gas components were taken in an isolated measuring path behind the boiler. The soot number was determined with a Bacharach hand pump and the carbon dioxide and carbon monoxide concentrations with an infrared gas analyzer URAS 2. The operation of all four burners was tested under a constant underpressure of 1.0 mm water. The four burners reacted quite differently to the quality changes of the used fuel oils. The soot number which was used as a measure of the combustion quality was primarily influenced by the viscosity of the oil which altered the throughput. With increasing viscosity, the oil throughput increased. The combustion air surplus was reduced so that the soot formation increased because of a lack of oxygen. Burners which operated with a low surplus of primary air were more sensitive to oil quality changes than burners operating with a high air surplus. For a determination of the significant relationships between the characteristic data of the oil quality and the combustion data, multiple regression analyses were performed. This way equations for the calculation of the soot number, the CO2 concentration, and the oil throughput were obtained.

25786 **APTIC NO. 47418**

Hay, Harold R.

THE SOLAR ERA. PART 3--SOLAR RADIATION: SOME IMPLICATIONS AND ADAPTATIONS. *Mech. Eng., 94(10):24-29, Oct. 1972. 15 refs.*

The natural air conditioning of rooms and the utilization of solar radiation are discussed. Under strong insolation, the surfaces of black materials of high thermal conductance and storage tend to be hot, the surfaces of white materials tend to be cooler, and corresponding thermal effects exist below the surface; reverse effects tend to exist below white and black particulate or fibrous insulating materials. Benefits which may accrue from both hot-black and cool-black effects in nature are described, including agricultural use of black cinders as a mulch which collects significant quantities of dew and transfers them to the underlying soil. Warm-white effects are also considered, especially with regard to pigmentation and genetic adaptation. Established sandwich-panel technology using cellular plastics permits new and highly desirable types of construction, including exterior thermal insulation and internal heat storage materials. Solar stills and water heaters are discussed, and costs are considered. Yakh-chals or ice walls which were built in the deserts of the Middle East are also described.

25787 **APTIC NO. 47363**

Ichikawa, Michio

CHARACTERISTICS OF VARIOUS COMBUSTION METHODS AND PROBLEMS OF FURNACES. *(Kakushu nenshoho no tokucho to ro no mondaiten). Text in Japanese. Kagaku Kojo (Chem. Factory), 16(7):10-14, July 1972. 7 refs.*

Combustion characteristics of plastics wastes and the furnace designed to incinerate them are discussed. A 1970 survey revealed that the thermoplastic wastes accounted for 92.1% of the total plastic wastes and the thermosetting plastics wastes for 7.84%. Fed into a high-temperature furnace, most of the thermoplastic wastes melt and give the gas-phase combustion while rapidly evaporating or being decomposed. The thermosetting plastics do not melt even when heated, only giving the superficial combustion. Thus, they are hard to burn. If mixed with the thermoplastics wastes, the surface of the thermosetting type is covered with the molten thermoplastics during incineration, so that the combustion will become even more deficient. Therefore, periodical stirring and ventilation of the furnace are necessary for effective combustion of the plastic wastes. White or black smoke and hydrogen chloride gas can be emitted by the combustion of the plastics wastes. The calorific value of the plastic wastes is estimated to range from 4000-5000 and 10,000-11,000 kcal/kg is not much problem for the furnace designed exclusively for incineration of the plastic wastes. The hearth type furnace, rotary furnace, tangential firing furnace, fluid bed furnace, and fire-grate combustion are mentioned. An ideal plastic wastes incinerator must have larger combustion capacity and trouble-free structure, perfect combustion emitting no soot, no emission of harmful gases, a continuous feed-in system with constant performance, and the ability to permit heat utilization.

25788 **APTIC NO. 47410**

Jansen, Peter, Siegfried Jordan, and Wolfgang Schikarski

COMPARATIVE MODEL THEORY OF ATMOSPHERIC POLLUTION BY POWER PLANTS. *(Vergleichende Modelltheorie der atmosphaerischen Schadstoffbelastung durch Kraftwerke). Text in German. Staub, Reinhaltung Luft, 32(11):454-458, 1972. 33 refs. (Presented at the Colloque IRCHA sur les Atmospheres polluees, 10th, Paris, France, May 3-5, 1972.)*

On the basis of maximum permissible concentrations, simplified box models were developed to compare air pollution from nuclear and fossil-fueled power plants. Assuming exponential decay of the pollutants, body burden functions for the main pollutants from different types of power plants were calculated and compared. These pollutants include dust, sulfur dioxide, nitrogen oxides, fluorine compounds, xenon(133), and krypton(85). The pollutant body burden of nuclear power plants was found to be much smaller than that of fossil fueled plants. Power stations fueled with natural gas gave relative body burdens which are smaller than those from power plants fueled with hard coal, brown coal, and oil, but larger than those from nuclear power plants. Krypton(85) released from reprocessing plants was the main pollutant of nuclear power systems.

25789 **APTIC NO. 47311**

Jelambi, Octavio

AIR POLLUTION IN LATIN AMERICA. *(La pollution atmospherique en Amerique Latine). Text in French. Colloq. Int. Homme, Air Eau, Paris, France, 1972, 8p. (June.)*

General problems of air pollution in some Latin-American capitals, and measures taken or considered to control air pollution are surveyed. Caracas, accommodating four monitoring stations of the Panamerican Network, has no critical pollution problems, while the carbon monoxide concentrations, mostly due to automotive exhaust and municipal waste incinerators, range from 20 to 80 ppm. The serious air pollution problems in Mexico City are mainly associated with automotive exhaust

CO. Epidemiological investigations are being conducted, and 11 monitoring stations are in operation. The Federal Act for the Prevention and Control of Air Pollution was adopted in May 1971. Air pollution problems have just been attacked in Bogota where five more monitoring stations will be added to the existing four stations. Air pollution standards for industrial emissions were adopted in 1971. Emission measurements around fish meal factories in Lima have been taken up. Automotive exhaust, industrial emissions, and the use of low-grade solid fuel have created serious pollution in Santiago where four monitoring stations of the Panamerican Network are in operation. Air pollution problems are caused mostly by automotive exhaust CO emissions in Buenos Aires. Here, three monitoring stations are run, and a Federal Act for Air Pollution Prevention is being studied. Automotive exhaust and a large number of domestic waste incinerators are chiefly responsible for air pollution in Rio de Janeiro, which has only one monitoring station. Exhaust emissions, municipal waste incinerators without adequate emission control equipment, and industrial emissions have created rather critical conditions in Sao Paulo where 20 monitoring stations will be added to the one operating presently. Concentrations of suspended and settling particles and sulfur dioxide are listed for the monitoring stations.

25790 **APTIC NO. 47647**

Jo, Shakko

AN INTRODUCTION TO AUTOMOTIVE EMISSION. *(Haiki gairon). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 11(131):5-10, Nov. 1972.*

Automobile exhausts contain carbon monoxide, hydrocarbons, nitrogen oxides, sulfur oxides, lead compounds, soot, and oil mist. The emission of sulfur oxides is so small in comparison with other emission sources that it is usually disregarded in the light of environmental pollution control. However, its detrimental effect to the catalyst of an exhaust gas cleaner must be noted. The grain-size distribution of lead particulates was studied and compared between the lead and no-lead gasoline fuels. The lead compounds are not only harmful to the environment but also detrimental to the cleaner s catalyst. The soot generation is largely affected by air/fuel ratio. In an experiment with a four-cycle gasoline engine, larger carbon particulates tended to increase with no-lead fuel than with leaded fuel. Automotive emission control criteria are introduced. The standard test methods in relation to the control criteria are also briefly discussed; they are the four-mode test method in Japan and the seven-mode method in the U.S.A. The emission characteristic versus specific power is reviewed. Using the same engine operated under the same conditions, the vehicle weight was reduced by 30% in one case and increased by 30% in another to increase and decrease the specific power. In the former case, HC and CO decreased by 13.8% and 22% respectively in comparison with normal, but NOx remained almost the same. In the latter, HC, CO, and NOx increased by 10.9%, 31% and 7.3% respectively. These figures can be affected greatly by the air/fuel ratio of the carburetor. Their emissions given at air/fuel ratios of 10-11, 12-13, 13-16, and 19-20 are shown.

25791 **APTIC NO. 47433**

Knop, Wilhelm

SOURCES OF EMISSION AND MEASURES FOR THE MAINTENANCE OF CLEAN AIR IN ANIMAL FLAYING STATIONS. *(Emissionsquellen und Massnahmen zur Luftreinhaltung in Tierkoerperbeseitigungsanstalten). Text in German. Zentr. Arbeitsmed. Arbeitsschutz, 22(9):259-264, Sept. 1972. 14 refs.*

In animal flaying stations, odorous waste air develops through the storage of the raw material for more than 24 hours, primarily in the summer months. Odorous waste air is also produced during depressurizing the cooker and drying of the material. During charging and emptying of the cookers, odorous waste air escapes. The condensation water is also a source of odor emission as is the storage room for the meat meal. A rapid processing of the raw material is important for keeping the odor development low. For removal of odorous substances in the waste air, scrubbers and thermal afterburners are used. The scrubbers most suitable for this purpose are the venturi scrubbers and scrubbing towers. Chlorine or chlorine dioxide is used as an oxidant. In the U. S., a diluted potassium permanganate solution was successfully used as the scrubbing fluid. The methods of thermal and catalytic afterburning are reviewed. Both methods proved to be quite suitable while the method of removal of the odorous substances by condensation proved to be less efficient, because a certain fraction of odorous substances is always left in the waste gas.

25792 **APTIC NO. 47704**

Kurihara, Shiro

CHARACTERISTICS OF DOMESTIC REFUSE AND EXAMINATION OF TREATMENT METHODS (7). *(Seikatsukei kotai haikibutsu no seijo to sono shori no kosatsu (7)). Text in Japanese. Yosui to Haisui (J. Water Waste), 14(9):1165-1169, Sept. 1972.*

The main elements designated as pollutants by the Bad Odor Control Law of May 17, 1972, their characteristics, and their sources are as follows: hydrogen sulfide (rotten egg odor) from Kraft pulp mills, petroleum refineries, rayon manufacturing, cellophane manufacturing, chemical processing, starch manufacturing and sewage treatment plants; methyl mercaptan (rotten onion odor) from Kraft pulp mills, petroleum refineries, pharmaceutical manufacturing, chemical processing, feather processing, starch manufacturing, garbage treatment, and sewage treatment plants; methyl sulfide (rotten cabbage odor) from Kraft pulp mills, petroleum refineries, and pharmaceutical manufacturing plants; ammonia (stinging odor), from fertilizer and petroleum chemical processing, fishmeal and animal offal processing, chicken excreta drying, feather processing, garbage treatment, sewage treatment plants, and slaughterhouses; and toluymethylamine (rotten fish odor) from fish meal plants, feather processing plants, fish product canneries, garbage treatment plants, stockyards, and slaughterhouses. Indexes for the maximum allowable odor should be 3.5, which will be 5 ppm of ammonia, 0.01 ppm of methyl mercaptan, 0.2 ppm of hydrogen sulfide, 0.2 ppm of methyl sulfide, and 0.07 ppm of toluymethylamine. Physiological effects of odors and odor measuring methods are briefly discussed.

25793 **APTIC NO. 47600**

Makhijani, A. B. and A. J. Lichtenberg

ENERGY AND WELL-BEING. *Environment, 14(5):10-18, June 1972. 15 refs.*

Since the utilization of energy and material resources has both provided us with diverse necessities and comforts and contributed to the deterioration of the environment, an evaluation of the degree of efficiency in the use of energy and materials is useful. The present efficiency in both energy and material resources utilization is low and that considerable improvement is possible. Effects of energy and materials consumption which appear in the various forms of waste discharged to the environment are considered. An analysis is made of the energy and materials consumption according to the goods consumed in the United States. The energy content of various consumer goods and the total and per capita energy consumption as represented by each item are presented. Five methods of reducing energy and/or raw materials consumption are considered: use of solar energy; utilization of waste heat from the generation of electricity; materials and product reuse and recycling; improvement of fuel usage efficiency in transportation; and improvement in the thermal efficiency of electric power plants.

25794 **APTIC NO. 47404**

Marchetti, C.

HYDROGEN FOR THE ENERGY MARKET. *(Waterstof voor de energiemarkt). Text in Dutch. Polytech. Tijdschr., Ed. Procestechniek (The Hague) 27(16):530:537, Aug. 1972. 24 refs.*

The extensive use of a new, flexible, nonpolluting source, hydrogen, is suggested. Nuclear energy, used nowadays especially in the form of electricity, also offers an interesting possibility for the production of hydrogen in large-capacity nuclear power plants. The hydrogen thus generated could be used for a variety of purposes such as in households, chemical industries, food processing industries for the hydrogenetaion of vegetable oils or for the production of primary protein, for iron ore reduction, and in transport. Direct injection and Stirling engines as well as electromotors with fuel cells are most promising regarding the use of hydrogen as transport fuel in automobiles. Other possibilities such as the use of hydrazine, ammonia, or metal hydrides as fuel are being studied. Hydrogen also makes a very good fuel for aircraft, including supersonic jets.

25795 **APTIC NO. 47495**

Masek, Vaclav

CONTRIBUTION TO THE STUDY OF THE PROPERTIES OF COKERY FLY ASH. PART ONE. *(Neue Erkenntnisse ueber die Eigenschaften des Flugstaubes aus der Kokerei. Teil I). Text in German. Zbl. Arbeitsmed., 22(2):38-47, 1972. 20 refs.*

Sorption, ion exchange and contact-catalytic properties, electrokinetic potential, and crystalline quartz modifications of three different fly ash samples from cokery coke preparation, a coke oven battery, and coke screening stages, respectively were studied. The samples had soot contents of 10, 168, and 6 micrograms/g, and the 3,4-benzopyrene contents were 3, 98, and 2 micrograms/g. The absorption property of the fly ash was generally poor, and so was the adsorption of gases and vapors. The ion exchange capacities were, especially for sodium, potassium, and ammonia, relatively low. The electrokinetic potentials of the particles were, though positive, very small. The contact-catalytic properties of all three samples, determined in reactions with hydrogen peroxide, were very poor. The results indicated very limited activity of the fly ash. Samples from the cokery coal preparation stage contained no tridymite and cristobalite, while samples from the upper stories of the coke oven and from the screening stage contained tridymite.

25796 **APTIC NO. 47405**

Meester-Broertjes, H. A.

AIR POLLUTION BY AIRPORTS. *(Luchtverontreiniging door luchthavens). Text in Dutch. Polytech. Tijdschr., Ed. Procestechniek (The Hague), 27(21):683-693, Oct. 1972.*

Various aspects of air pollution at airports, especially at Schiphol, were studied. The analysis is based on the number of planes taking off and/or landing, the emission figures for various phases of the flying operation such as idle, taxiing, start, climbing, flying, approaching, and landing and on the frequency of various types of aircraft using the airport. The carbon monoxide emission is largest during idle with 174 kg/t of fuel, compared with 8.7 kg/t during approach, and 0.7 kg/t during start. The nitrogen oxides concentration is 5-20 ppm during idle and 50-100 ppm during start. The hydrocarbon emission is 150-1000 ppm at idle and 1-5 ppm during start. The hydrocarbon emission is 150-1000 ppm at idle and 1-5 ppm during start. These values are lower for jet than for piston engines. The aldehyde concentrations at idle range from 2.0 to 14.8 ppm for different types of aircraft, compared with values of less than 0.4 ppm at maximum load. The sulfur dioxide concentrations at idle and during start are 4-5 ppm and 8-12 ppm, respectively. Calculations show that the contribution by aircraft to the total air pollution from all possible sources in a country is negligible.

25797 **APTIC NO. 47708**

Meuthen, Bernd

CLEAN AIR MAINTENANCE-RELATED PROBLEMS FROM THE COIL COATING INDUSTRY VIEWPOINT. *(Probleme der Luftreinhaltung aus der Sicht der coil coating-Industrie). Text in German. Fachber. Oberflaechentech., 10(7):231-235, 1972. 12 refs.*

Problems of pollution control in the coil coating industry are reviewed. Coil coating plant-generated emissions constitute complex gaseous mixtures of solvents with partly unknown, though malodorous, reaction products as well as various additives of organic nature. The contribution by the coil coating industry to overall air pollution is estimated at well below 1%. The emissions, practically independent of the specific heat treatment process, are in the neighborhood of 3 g/N cu m. Catalytic waste gas incineration for odor destruction, in a temperature range of 250-500 C, proved not to be feasible due to catalyst poisoning. Thermal incineration in a temperature range of 600-800 C and at a reaction time of 0.5-1.5 sec represents, however, a solution of practical interest. The use of water-dispersible acrylates, polyesters, oxides, solvent-free powder lacquers, or the electron beam curing process are potential methods for the abatement of coil coating plant-generated emissions.

25798 **APTIC NO. 47551**

Miller, John G. W.

ELECTRICITY - WHO NEEDS IT? Preprint, Inst. of Management Sciences, Pleasantville, N. Y., 18p., 1972 (?). 34 refs. (Presented at the Institute of Management Sciences, International Meeting, 19th, Houston, Tex., 1972.)

A brief historical background to the field of electric power generation is presented. Figures are given for forecasting future trends. An attempt is made to answer, in quantitative terms, such questions as-- Who uses all the electric power generated within the United States? What will be their requirements in the future? How will this power be generated? What effects will these methods have on the environment? Salvation, at least for the next century, would seem to lie with the breeder reactor, but further money and effort are needed to bring this system on line. Fuel supplies will last until about the year 2060 thereby giving breathing space in which to develop the fusion reactor. (Author abstract modified)

25799 **APTIC NO. 47521**

Miller, M. S., S. K. Friedlander, and G. M. Hidy

A CHEMICAL ELEMENT BALANCE FOR THE PASADENA AEROSOL. *J. Colloid Interface Sci., 39(1):165-176, April 1972. 35 refs.*

A method was developed for calculating on a chemical element-by- element basis the contribution of varius sources to the aerosol of a polluted atmosphere. Four major sources were considered and their relative contributions estimated by employing certain trace elements characteristic of each source; sodium, aluminum, lead, and vanadium were utilized for sea salt, soil, automobile emissions, and fuel fly ash, respectively. Most of the data used in the calculations were taken from the results of other investigators. New data are reported for soil dust and fuel oil fly ash, including evidence for a fractionation effect in wind raised dust. Calculated compositions for the Pasadena aerosol are in fair agreement with measured values for many elements. Deviations can be explained in most cases in terms of other anthropogenic sources and atmospheric reactions. (Author abstract modified)

25800 APTIC NO. 47638

Nagata, Katsuya, Ken Okazawa, Chihiro Tsurumi, and Kaoru Tokunaga

STUDIES ON GENERATION OF NITROGEN OXIDES IN BOILER AND ITS CONTROL MEASURES; 4TH REPORT, FORMATION PROCESS ON NOX AND ITS ESTIMATION METHOD. *(Boira ni okeru chissosankabutsu no hassei to sono yokuseitaisaku ni kansuru kenkyu; Dai yonpo, NOx seiseikatei to sono suisanho). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 21-24, 1972. 1 ref. (Presented at the Japan Society of Mechanical Engineers, Hamamatsu, June 23, 1972.)*

The generation process of nitrogen oxides in a boiler was studied and, based on the temperature, an estimation formula of NOx formation, taking into account the reaction velocity, was developed and reviewed. Most of the NOx generated in a heavy oil boiler is nitric oxide, and, considering the formation mechanism of nitrogen dioxides, the formation velocity of NOx can be replaced with that of NO. From the apparent reaction expression representing the formation of NO, an equation expressing the NO formation velocty was developed. The reaction velocity constant k of the equation was assumed to be in accordance with the Arrhenius equation, and thus established. Quantity of NOx generation is estimated by integrating the k by the remaining time according to the temperature. In the flame interior, the estimation of NOx generation made by using the reaction velocity constant k conforms to the actually measured pattern of the NOx values in most cases. The combustion in the reaction surface of the oil drops can be assumed to be taking place with an air ratio of 1.0 for the estimation, even when the ratio is actually below 1.0. A greater value of activation energy in the post-flame stage or a smaller value in the case where the maximum flame temperature is comparatively lower has to be used in the estimation, indicating a difference from the reaction form mentioned above.

25801 APTIC NO. 47645

Nagata, Katsuya, Hirosho Honma, Nikio Horita, and Kunihiro Matsubara

GENERATION OF NITROGEN OXIDES IN COMBUSTION DEVICE AND ITS CONTROL MEASURES; RELATION BETWEEN EMISSION AND COMBUSTION CONDITIONS IN ACTUALLY OPERATED BOILER. *(Nenshosochi no okeru chissosankabutsu no hassei to yokushitaisaku; Jitsudo boira ni okeru haishutsu jokyo to nenshojoken tono kanren). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 189-203, 1972. 6 refs. (Presented at the Japan Society of Mechanical Engineers, Lecture Meeting, 823rd, Tokyo, Japan, Nov. 20-21, 1972. Paper 720-19.)*

Selecting several small-sized boilers actually in use, the relation between nitrogen oxides and the combustion conditions was examined. For measurement of the NOx concentration, continuous analysis by a NOx meter and chemical analysis by the Saltzman method were used. The boilers selected for this study were used for heating/cooling purposes or as a factory s steam source. Their evaporation capacity ranged between 5 t/hr and 26 t/hr. The NOx emission against the calorific value was 1-5 kg/10,000,000 kcal. Boiler capacity had no effect on the NOx emission. There was a considerable correlation between the gas temperature in the combustion chamber and the NOx emission, indicating higher NOx emission with higher combustion temperature. There was the same tendancy in relation to the heat load of the combustion chamber. The relationship between the excess air ratio and the NOx emission in a boiler can be categorized into three patterns. The pattern a particular boiler will take is determined by the operating range of the air ratio and the mixing characteristic of fuel and air. Type of fuel used also causes the NOx emission to change. The NOx emission was lower with kerosene than with heavy oil, and lowest with city gas.

25802 APTIC NO. 47646

Nagata, Katsuya, Hiroshi Honma, and Kumito Yamazaki

STATISTICAL REVIEW OF CONTRIBUTION OF MOBILE AND STATIONARY EMISSION SOURCES TO NITROGEN OXIDE CONCENTRATION IN THE ATMOSPHERE. *(Taikichu no NOx nodo ni taisuru idohaishutsugen to koteihaishutsugen no kiyodo ni tsuiteno tokeigakuteki kosatsu). Text in Japanese. Preprint, Society of Automotive Engineers of Japan, Inc., Tokyo, p. 309-314, 1972. 4 refs. (Presented at the Society of Automotive Engineers of Japan, Fall Meeting, Tokyo, Oct. 1972.)*

Automotive emissions are one cause of photochemical smog. The formation of oxidant is influenced by the concentration ratio between hydrocarbons and nitrogen oxides. Stationary sources such as boilers are more responsible than the mobile sources such as automobiles for NOx. About 70% of the total NOx emission in Tokyo is attributable to stationary sources and only 30% attributable to the mobile sources. The percentage of the total NOx emission that can be attributed to boilers representing the stationary sources and to automobiles representing the mobile sources was mathematically estimated for Tokyo. For this estimation, sulfur dioxide was assumed to be solely from boilers and carbon monoxide solely from gasoline engine automobiles. The percentage of the total HC that can be attributed to stationary sources or mobile sources can be calculated from the actually measured values of SO2 and CO. By applying a regression equation to the actually measured data, the regression coefficients a for the CO and b for the SO2 were established. The correlation coefficient between the NOx and CO or SO2 was also calculated. The contribution ratio for the NOx between the stationary and mobile sources was estimated to be 1:2 at Tochomae, 1:2 at Kokusetsu, and 1:1 at both Kojiya and Joto measuring stations in Tokyo.

25803 APTIC NO. 47340

Obernolte, Wolfgang

UNINTERRUPTED POWER SUPPLY AND ENVIRONMENTAL PROTECTION - AN INSOLUBLE CONFLICT OF INTEREST? (Sicherheit der Stromversrogung und Umweltschutz - ein unloesbarer Zielkonflikt)? Text in German. Elektrizitaetswirtschaft, 71(23):658-661, 1972.

Without a doubt, power generation contributes a good deal to the pollution of the environment through the emission of dust, sulfur dioxide, waste heat, and oxides of nitrogen. This list of pollutants has been recently expanded by discovering mercury emissions from coalfired power plants. The Federal Republic of Germany believes that the emission by these plants must be checked and reduced to an extent which is not harmful to the population. At the same time, the erection of new power plants with a capacity of about 60,000 MW over the next 10 years is indispensable. The use of nuclear energy for power production will increase and all measures to keep the environmental pollution within limits will be taken; the total avoidance of pollution is irreconcilable with the demand of safeguarding an uninterrupted power supply.

25804 APTIC NO. 47721

Pilet, P. E., R. Chollet, and G. Jaccard

AN ATMOSPHERIC POLLUTANT: SULPHUR DIOXIDE. *(Un pollutant atmospherique: l anhydride sulfureux). Text in French. Pollut. Atmos. (Paris), 14(55):237-241, July-Sept. 1972. 29 refs.*

The city of Lausanne, Switzerland, has experienced a decrease in sulfur dioxide concentrations similar to London and Paris. In addition to the beneficial effects of the anti-pollution laws, vegetation and photosynthetic activity have helped to purify the air. A general rule of functional interaction is posed: according to the ecological conditions and the nature of the other pollutants present, sulfur dioxide blends with or is opposed by these pollutants. Variations in the amount of sulfur dioxide between winter and summer, as well as between night and day, are presented tabularly.

25805 APTIC NO. 47315

Prakash, C. B. and F. E. Murray

STUDIES ON AIR EMISSIONS FROM THE COMBUSTION OF WOOD-WASTE. *Combust. Sci. Technol., 6(1/2):81-88, Sept. 1972. 9 refs.*

The combustion of wood waste was investigated under controlled conditions to establish the effects of process parameters on the emission of air pollutants. The temperature in the combustion zone was the most important parameter affecting the process and associated air pollutants. Air pollutant concentrations were minimal at combustion zone temperatures greater than 1100 F. The hydrocarbons in aerosol form in the exhaust gases were determined as abiatic acid and stearic acid; the gaseous hydrocarbon was mostly methane. The average combustion rate increased with increasing temperature, with decreasing moisture content in the fuel, with increasing total air flow rate, and with decreasing secondary-to-primary air ratio. The particle size in the wood waste and the type of grate were also important variables for the combustion process. (Author abstract modified)

25806 APTIC NO. 47630

Prescott, James H.

ENERGY REFINERIES ARE EYED. *Chem. Eng., 79(21):80-82, Sept. 18, 1972.*

The growing shortage of natural gas and other suitable forms of energy in the U. S. has led to a number of proposals for energy refineries in this country. At least seven companies have requested Federal Power Commission approval to import crude oil for conversion to either substitute natural gas (SNG) or to low-sulfur fuel oil. Such refineries might be a short-range answer to the energy crisis. The proposed SNG refineries would run 100,000 bbl/day or more of imported crude oil. All but two of the seven refineries would make low-sulfur fuel oil in addition to SNG. The crude oil cost, transportation costs, and values of SNG and low-sulfur fuel oil would affect the economic advantages of the refinery. Several SNG conversion processes are mentioned including fractionation, hydrocracking, hydrogenation, and gasification. The approval for these refineries will depend on import regulations, FPC price control regulations, environmental regulations, and site selection. Major oil companies feel that the imported crude oil processing concept is based on a false premise -- that foreign crude will remain cheaper than domestic. They are also reluctant to build the refineries because of a lack of money; the industry can come up with only $85 billion of the $140 billion needed between now and 1985 for exploration, production, and other activities.

25807 APTIC NO. 47389

Savery, C. William

FUTURE ENERGY SOURCES FOR TRANSPORTATION. *Traffic Quart., 26(4):485-499, Oct. 1972. 30 refs.*

Current use of energy in the United States for transportation and its projected use in the future are considered. The energy consumed for transportation systems (auto, bus, train, and plane) can be considered from the point of view of use or by the distribution of products produced from petroleum. Three means of conserving transportation fuel sources are considered: a changed energy source mix achieved by substituting nuclear energy sources for those non-transportation sources presently served by oil and natural gas; new automobile technology resulting in improved fuel economy; and the substitution of new electric power transportation systems and vehicles for those currently fueled with fossil sources. Performance and characteristics of conventional spark ignition, Wankel, stratified charge, diesel, gas turbine, Stirling, steam engines are compared. Three synthetic fuels are considered. The first is produced by recycling waste trash, animal wastes, or crop residues; the fuels produced would be hydrocarbon fuels. The second synthetic fuel discussed is hydrogen, and the third is ammonia.

25808 APTIC NO. 47413

Scholz, Norbert

THE ENVIRONMENTAL EFFECTS OF TURBO-AIRCRAFT ENGINES. *(Die Umweltwirkungen von Turboflugtriebwerken). Text in German. Z. Flugwiss., 20(9):317-330, Sept. 1972. 38 refs.*

The problem of heat, noise, and pollutant emissions from turbojet engines is reviewed. The heat radiation from turbojet engines, in a wavelength range of 0.5-50 micron, is composed of surface radiation and of gas jet radiation. The intensity of the latter is nearly proportional to the gas volume, and is strongly dependent on the temperature. The average radiation intensity for complete afterburning and a throughput capacity of 100 kg/sec is about 18.3 kW/steradian, against a value of some 2 kW/steradian for the surface radiation intensity. The pollutant emission from turbojet engines, in the form of carbon monoxide, hydrocarbons, nitrogen oxides, and finely dispersed carbon particles has a contribution of about 1% to the total atmospheric pollution load, while sulfur dioxide and lead emissions are negligible. Highest hydrocarbon, CO, and nitrogen oxides concentrations occur throughout within the primary combustion zone with maximum temperature. Investigations revealed partly contradictory possibilities for the reduction of the individual emission components (limitation of the maximum temperature within the primary combustor zone to 1800 K for reducing nitrogen oxides emissions, extension of the intermediate zone to increase the rates of CO and C oxidation, reduction of the fresh air supply to the mixing zone for good gas kinetic reactions, reduction of the primary zone pressure to abate carbon formation, and improvement of the fuel distribution to prevent the local formation of fat mixtures). Methane and molecular hydrogen are regarded as potential fuels for a distant future.

25809 APTIC NO. 47359

Schwedler, R.

LONG-DISTANCE HEAT SUPPLY AS A FUTURE TASK IN CITY PLANNING AND DOWN-TOWN REORGANIZATION. *(Die Fernwaermeversorgung als Zukunftsaufgabe beim Staedtebau und der Stadtkernsanierung). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 184:35-38, 1972.*

Technical, public relations, and economical aspects of the long- distance heat supply as a major contribution to pollution control are outlined. Remote heat supply systems are able to efficiently utilize waste heat from thermal and other power plants and waste incinerators located at acceptable distances from urban agglomerations. Direct feed with temperature reduction and water volume increase at the consumer end is regarded as a modern solution. A tentative plan envisages a large underground lake as heat storage unit near nuclear power plants, which would store most of the heat not used up in summer for the winter peak.

25810 APTIC NO. 47599

Seizinger, D. E. and B. Dimitriades

OXYGENATES IN AUTOMOTIVE EXHAUST GAS. ESTIMATION OF LEVELS OF CARBONYLS AND NONCARBONYLS IN EXHAUST FROM GASOLINE FUELS. *Bureau of Mines, Bartlesville, Okla., Bartlesville Energy Research Center, Rept. Investigations 7675, 30p., 1972. 18 refs.*

Analytical methods which are primarily gas chromatographic were developed for measurement of automotive exhaust oxygenates produced from selected simple fuels. The application of the iodic acid method for measurement of total functional groups in exhaust organics is discussed. Levels of carbonyls and noncarbonyl oxygenates in the exhaust from gasoline fuels were estimated. Estimated noncarbonyl oxygenates in gasoline exhaust may comprise as much as 30% of total oxygenates which include unsaturated carbonyls and noncarbonyls believed to be significant potential pollutants. (Author abstract modified)

25811 **APTIC NO. 47801**

Skinner, J. H., R. P. Shah, and W. A. Boothe

MODELING, ANALYSIS, AND EVALUATION OF RANKINE CYCLE PROPULSION SYSTEMS. VOLUME I. (FINAL REPORT). *General Electric Co., Schenectady, N. Y., Mechanical Engineering Lab., Office of Air Programs Contract EHS-70-111, GE Rept. S-71-1129-1, Rept. APTD-0960, 191p., Feb. 1972. 37 refs.*

NTIS: PB 209277

A generalized computer model of a Rankine-cycle automotive propulsion system was developed to be used for the analysis of propulsion system dynamics. Digital computer models were developed for the following propulsion components: water and organic working fluids; combustor; vapor generator; reciprocating and turbine expanders; condenser; regenerator; feedpump; and controls. Other vehicle system models were developed to permit analysis of engine dynamics during realistic driving transients. These included models of transmission, vehicle motion, route mission profiles, and driver. The programming language is FORTRAN IV. Recommendations are made.

25812 **APTIC NO. 47434**

Squires, Arthur M.

CLEAN POWER FROM DIRTY FUELS. *Sci. Am., 227(4):26-35, Oct. 1972.*

Advantages of the gas turbine for power applications are reviewed, as well as the Lurgi gasifier for making a power gas from coal at high pressure with which to drive a turbine. In the Lurgi gasifier, coal is treated in a gravitating bed. Descending coal is first dried and turned into coke by the hot gases rising from lower in the bed; in the next layer down carbon is gasified to yield hydrogen and carbon monoxide; below that the remaining carbon is burned to provide the heat for the reactions above. The gas is cooled and then scrubbed to remove hydrogen sulfide. Ashes are expelled by a rotating grate. Other techniques for gasifying coal are also considered, as well as the production of power gas from residual oil. A highly efficient system is outlined which would produce gas turbine and steam turbine power and marketable by-products. It is based on the cracking of residual oil at about 700 C and elevated pressure to yield three low sulfur products: pea-size coke pellets, a light aromatic oil, and a rich fuel gas. Each of these would be in a quantity equivalent to about a fifth of the oil s heating value. The remaining heating value would be available as high level heat (steam) and as clean power gas for firing a gas turbine that compresses air for the system and provides auxiliary power. The rich fuel gas and steam would be used promptly to generate power; the light oil and coke could be stored for use during periods of peak demand or be shipped to market.

25813 **APTIC NO. 47407**

Versloot, J.

WHAT IS THE MINTO MOTOR? (Wat is de mintomotor)? Text in Dutch. Polytech. Tijdschr., Ed. Werktuigbouw., 27(16):515-518, Aug. 1972.

The Minto motor, developed by the Kinetics Corp., Sarasota, Florida, is described. The motor is based essentially on the Rankine system, and comprises a heat-exchanger, a drive motor, a condenser, and a circulation pump. The heat necessary for the heat-exchanger is obtained through the continuous, explosion-free combustion of hydrocarbons such as kerosene, fuel oil, or gasoline. The heat-exchanger utilizes the combustion heat for the evaporation and overheating of a process medium called UCON-113, consisting of a fluorocarbon compound. It is not combustible or explosive. Part of it is directed to an auxiliary motor for driving the dynamo. The new system ensures complete combustion and direct conversion of thermal energy into rotary motion without the need of pistons. The exhaust gas is composed almost exlusively of carbon dioxide and water and very small amounts of nitrogen oxides due to combustion at atmospheric pressure and recirculation and cooling before discharge. The exhaust gas contains no carbon monoxide and unburned hydrocarbons. The total pollutant concentration in the exhaust gas is less 1% compared to conventional engines.

25814 **APTIC NO. 47490**

Voelz, F. L., E. C. Coleman, J. S. Segal, and B. G. Gower

EXHAUST EMISSION LEVELS OF IN-SERVICE VEHICLES -- COMPARISON OF 1970 AND 1971 SURVEYS. *Preprint, Society of Automotive Engineers, Inc., New York, 8p., 1972. 4 refs. (Presented at the Society of Automotive Engineers National Automobile Engineering Meeting, Detroit, Mich., May 22-26, 1972, Paper 720498.)*

The results of nationwide automobile exhaust emission surveys conducted in 1970 and 1971 are compared. The survey was concerned with data on average hydrocarbon and carbon monoxide emissions for engine speeds of idle and 2500 rpm. Vehicle distribution curves for hydrocarbon and CO emissions are also presented for the 1971 data for selected year groups based on emission control devices. Comparisons indicate that emissions have increased at both idle and 2500 rpm in the one-year period. The effects of carburetor adjustments on idle emissions are also compared for the 1970 and 1971 data. (Author abstract modified)

25815 **APTIC NO. 47595**

Williams, Robert H.

WHEN THE WELL RUNS DRY. *Environment, 14(5):19-20, 25-31, June 1972. 23 refs.*

According to the best estimates available, natural gas supplies, in terms of ultimately recoverable resources, are adequate for only 30-40 years. However, the best available estimates leave something to be desired. In particular, resource base estimates are based on the assumption that natural gas and crude oil are associated, while recent experience indicates that 75% of the time gas occurs indepently of crude oil. Much better information is needed on the extent of the resource base. Among supplemental sources of gas, Canadian imports, liquefied natural gas from abroad, synthetic gas from coal, and methane from organic wastes appear to be most promising. It is highly questionable whether nuclear gas stimulation will become commercial in the forseeable future--in the short run for economic reasons and in the long run for environmental considerations. Supply and demand with regard to our energy resources are discussed. (Author conclusions modified)

1971

25816 **APTIC NO. 47531**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF RHODE ISLAND. *APTD-1039, 15p., June 1971.*

NTIS: PB 210003

A list was compiled of the major facilities of real property owned by the Federal Government in Rhode Island. The installations are listed by location (city); brief descriptions of the installations, operating agencies, and size classifications are included. The list only includes those installations which present an air pollution potential. (Author summary modified

25817 **APTIC NO. 47540**

Little, Arthur D. Inc., Cambridge, Mass.

CHEMICAL IDENTIFICATION OF THE ODOR COMPONENTS IN DIESEL ENGINE EXHAUST. (FINAL REPORT). *Environmental Protection Agency Contract EHSD 71-18, Coordinating Research Council Proj. Cape-7-*

68, Rept. ADL 62561-5, APTD-0803, 155p., June 1971. 8 refs.

NTIS: PB 204421

The odor components of diesel exhaust were identified chemically by liquid column chromatography. The original exhaust odor was characterized as consisting about equally of oily-kerosene and smoky-burned odors. The smoky odor character was most consistently associated with hydroxy and methoxy indanones with some contributions from methyl and methoxy phenols. Burned odors were associated with furans and alkyl benzaldehydes. The oxidized oily character was ascribed to alkenones, dienones, hydroxy cyclocarbonyls, and indanones. Irritation factors seemed most frequently associated with the lower molecular weight phenols. Some benzaldehydes and methoxy benzenes might also contribute to this sensation. While some unsaturated aldehydes contributed to a portion of the exhaust odor complex, the most abundant exhaust aldehydes did not contribute significantly. Neither sulfur nor nitrogen-containing species contributed to the smoky-burned odor complex. (Author summary modified)

25818 **APTIC NO. 47559**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF KANSAS. *APTD-1062, 20p., June 1971.*

NTIS: PB 209980

A list was compiled of the major facilities of real property owned by the Federal Government in Kansas. The installations are listed by location (city); brief descriptions of the installations, operating agencies, and size classifications are included. The list only includes those installations which present an air pollution potential. (Author summary modified)

25819 **APTIC NO. 47560**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF OREGON. *APTD-1041, 21p., June 1971.*

NTIS: PB 210001

A list of the major facilities of real property owned by the Federal Government in Oregon was compiled. The installations are listed by location (city); brief descriptions of the facilities, the operating agency, and size classifications are included. The list only include those installations which present an air pollution potential.

25820 **APTIC NO. 47561**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF NEW MEXICO. *APTD-1047, 18p., June 1971.*

NTIS: PB 209995

A list was compiled of the major facilities of real property owned by the Federal Government in New Mexico. The installations are listed by location (city); brief descriptions of the installations, operating agencies, and size classifications are included. The list includes only those installations which present an air pollution potential. (Author summary modified)

25821 **APTIC NO. 47562**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF MAINE. *APTD-1059, 19p., June 1971.*

NTIS: PB 209983

A list was compiled of the major facilities of real property owned by the Federal Government in Maine. The installations are listed by location (city); brief descriptions of the installations, operating agencies, and size classifications are included. The list only includes those installations which present as air pollution potential. (Author summary modified)

25822 **APTIC NO. 47563**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF MARYLAND. *APTD-1058, 21p., June 1971.*

NTIS: PB 209984

A list was compiled of the major facilities of real property owned by the Federal Government in Maryland. The installations are listed by location (city); brief descriptions of the installations, operating agencies, and size classifications are included. The list only includes those installations which present an air pollution potential. (Author summary modified)

25823 **APTIC NO. 47564**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF MISSISSIPPI. *APTD-1054, 17p., June 1971.*

NTIS: PB 209988

A list was compiled of the major facilities of real property owned by the Federal Government in Mississippi. The installations are listed by location (city); brief descriptions of the installations, operating agencies, and size classifications are included. The list only includes those installations which present an air pollution potential. (Author summary modified)

25824 **APTIC NO. 47566**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF NEW HAMPSHIRE. *APTD-1049, 15p., June 1971.*

NTIS: PB 209993

A list was compiled of the major facilities of real property owned by the Federal Government in New Hampshire. The installations are listed by location (city); brief descriptions of the installations, operating agencies, and size classifications are included. The list only includes those installations which present an air pollution potential. (Author summary modified)

25825 **APTIC NO. 47567**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF NORTH CAROLINA. *APTD-1045, 21p., June 1971.*

NTIS: PB 209997

A list was compiled of the major facilities of real property owned by the Federal Government in North Carolina. The installations are listed by location (city); brief descriptions of the installations, operating agencies, and size classifications are in-

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cluded. The list only includes those installations which present an air pollution potential. (Author summary modified)

25826 **APTIC NO. 47568**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF NEW JERSEY. *APTD-1048, 20p., June 1971.*

NTIS: PB 209994

A list was compiled for the major facilities of real property owned by the Federal Government in New Jersey. The installations are listed by location (city); brief descriptions of the installations, operating agencies, and size classifications are included. The list only includes those installations which present an air pollution potential. (Author summary modified)

25827 **APTIC NO. 47570**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF ILLINOIS. *APTD-1014, 30p., May 1971.*

NTIS: PB 209977

Major facilities of real property owned by the Federal Government in the state of Illinois are compiled. Installations are listed alphabetically by the city in which they are located. A brief description of the installations is included. The agency which operates the facility is indicated, as well as the General Services Administration inventory number, the GSA Location code, total floor area of all the buildings, and a size classification code. Installations with a total floor area of less than 1500 sq ft have been omitted from this inventory as experience indicates that they do not currently present any air pollution potential. A map is presented of Federal regions of the Environmental Protection Agency, and regional air pollution control offices are given. (Author introduction modified)

25828 **APTIC NO. 47571**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE DISTRICT OF COLUMBIA. *APTD-1019, 18p., May 1971.*

NTIS: PB 209972

Major facilities of real property owned by the Federal Government in the District of Columbia are compiled. Installations are listed alphabetically by the city in which they are located. A brief description of the installation is included. The agency which operates the facility is indicated, as well as the General Services Administration inventory number, the GSA location code, total floor area of all the buildings, and a size classification code. Installations with a total floor area of less than 1500 sq ft have been omitted from this inventory as experience indicates that they do not currently present any air pollution potential. A map is presented of Federal regions of the Environmental Protection Agency, and regional air pollution control offices are given. Properties such as the Capitol, Senate, and House Buildings are not included. (Author introduction modified)

25829 **APTIC NO. 47572**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF CONNECTICUT. *APTD-1021, 17p., May 1971.*

NTIS: PB 209970

Major facilities of real property owned by the Federal Government in the state of Connecticut are compiled. Installations are listed alphabetically by the city in which they are located. A brief description of the installation is included. The agency which operates the facility is indicated, as well as the General Services Administration inventory number, the GSA location code, total floor area of all the buildings, and a size classification code. Installations with a total floor area of less then 1500 sq ft have been omitted from this inventory as experience indicates that they do not currently present any air pollution potential. A map is presented of Federal regions of the Environmental Protection Agency, and regional air pollution offices are given. (Author introduction modified)

25830 **APTIC NO. 47573**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF ARKANSAS. *APTD-1024, 20p., May 1971.*

NTIS: PB 209967

Major facilities of real property owned by the Federal Government in the state of Arkansas are compiled. Installations are listed alphabetically by the city in which they are located. A brief description of the installation is included. The agency which operates the facility is indicated, as well as the General Services Administration inventory number, the GSA location code, total floor area of all the buildings, and size classification code. Installations with a total floor area of less than 1500 sq ft have been omitted from this inventory as experience indicates that they do not currently present any air pollution potential. A map is presented of Federal regions of the Environmental Protection Agency, and regional air pollution offices are given. (Author introduction modified)

25831 **APTIC NO. 47574**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF ARIZONA. *APTD-1025, 21p., May 1971.*

NTIS: PB 209966

Major facilities of real property owned by the Federal Government in the state of Arizona are compiled. Installations are listed alphabetically by the city in which they are located. A brief description is included of the installation. The agency which operates the facility is indicated, as well as the General Services Administration inventory number, the GSA location code, total floor area of all the buildings, and a size classification code. Installations with a total floor area of less than 1500 sq ft have been omitted from this inventory as experience indicates that they do not currently present any air pollution potential. A map is presented of Federal regions of the Environmental Protection Agency, and regional air pollution offices are given. (Author introduction modified)

25832 **APTIC NO. 47575**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF WYOMING. *APTD-1028, 18p., June 1971.*

NTIS: PB 210014

Major facilities of real property owned by the Federal Government in the state of Wyoming are compiled. Installations are listed alaphabetically by the city in which they are located. A brief description of the installation is included. The agency which operates the facility is indicated, as well as the General Services Administration inventory number, the GSA location code, total floor area of all the buildings, and a size classification code. Installations with a total floor area of less than 1500 sq ft have been omitted from this inventory as experience indicates that they do not currently present any air pollution potential. A map is presented of Federal regions of the Environmental Protection Agency, and regional air pollution control offices are given. (Author introduction modified)

25833 **APTIC NO. 47576**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF VERMONT. *APTD-1033, 15p., June 1971.*

NTIS: PB 210009

Major facilities of real property owned by the Federal Government in the state of Vermont are compiled. Installations are listed alphabetically by the city in which they are located. A brief description of the installation is included. The agency which operates the facility is indicated, as well as the General Services Administration inventory number, the GSA location code, total floor area of all the buildings, and a size classification code. Installations with a total floor area of less than 1500 sq ft have been omitted from this inventory as experience indicates that they do not currently present any air pollution potential. A map is presented of Federal regions of the Environmental Protection Agency, and regional air pollution control offices are given. (Author introduction modified)

25834 **APTIC NO. 47577**

Office of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF UTAH. *APTD-1034, 18p., June 1971.*

NTIS: PB 210008

Major facilities of real property owned by the Federal Government in the state of Utah are compiled. Installations are listed alphabetically by the city in which they are located. A brief description of the installation is included. The agency which operates the facility is indicated, as well as the General Services Administration inventory number, the GSA location code, total floor area of all the buildings, and size classification code. Installations with a total floor area of less than 1500 sq ft have been omitted from this inventory as experience indicates that they do not currently present any air pollution potential. A map is presented of Federal regions of the Environmental Protection Agency, and regional air pollution control offices are given. (Author introduction modified)

25835 **APTIC NO. 47578**

Officy of Air Programs, Rockville, Md., Federal Sources Branch

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT IN THE STATE OF TENNESSEE. *APTD-1036, 21p., June 1971.*

NTIS: PB 210006

Major facilities of real property owned by the Federal Government in the state of Tennessee are compiled. Installations are listed alphabetically by the city in which they are located. A brief description of the installation is included. The agency which operates the facility is indicated, as well as the General Services Administration inventory number, the GSA location code, total floor area of all the buildings, and a size classification code. Installations with a total floor area of less than 1500 sq ft have been omitted from this inventory as experience indicates that they do not currently present any air pollution potential. A map is presented of Federal regions of the Environmental Protection Agency, and regional air pollution control offices are given. (Author introduction modified)

25836 **APTIC NO. 47601**

Scott Research Labs., Inc., San Bernadino, Calif.

VEHICLE OPERATIONS SURVEY. VOLUME I. (FINAL REPORT). *Coordinating Research Council, Inc. and Office of Air Programs CRC-APRAC Proj. CAPE-10-68 (1-70), SRL 2922-13-1271, APTD-1297, 148p., Dec. 17, 1971. 10 refs.*

NTIS: PB 210640

Automobile driving patterns are defined, determined, and typified in terms of operating modes. Data were collected in five major metropolitan areas and subsequently combined to form an overall composite of urban driving patterns. Traffic survey routes were also constructed for Los Angeles, Houston, Cincinnati, Chicago, and New York City. The data were processed to identify and summarize the basic vehicle operating modes: acceleration, deceleration, cruise, and idle. Mode characteristics such as frequency of occurrence, total duration, average duration, and transition probability were defined in matrix form. Supplementary information was obtained on average trip speed, acceleration-deceleration profiles, and manifold vacuum rates at various cruise conditions. Pattern similarities between cities and variability within a city were also defined. A road route representing the overall five-city composite was constructed in Detroit. Program objectives, procedures, and analysis of results are presented. (Author summary modified)

25837 **APTIC NO. 47602**

Scott Research Labs., Inc., San Bernardino, Calif.

VEHICLE OPERATIONS SURVEY. VOLUME II. (FINAL REPORT). *Coordinating Research Council, Inc. and Office of Air Programs Proj. CAPE-10-68 (1-70), SRL 2922-13-1271, APTD-1298, 148p., Dec. 17, 1971.*

NTIS: PB 210844

Automobile driving patterns were defined, determined, and typified in terms of operating modes. Data were collected in five major metropolitan areas and subsequently combined to form an overall composite of urban driving patterns. Traffic survey routes were also constructed for Los Angeles, Houston, Cincinnati, Chicago, and New York City. The data were processed to identify and summarize the basic vehicle operating modes: acceleration, deceleration, cruise, and idle. Mode characteristics such as frequency of occurrence, total duration, average duration, and transition probability were defined in matrix form. Supplementary information was obtained on average trip speed, acceleration-deceleration profiles, and manifold vacuum rates at various cruise conditions. Pattern similarities between cities and variability within a city were also defined. A road route representing the overall five-city composite was constructed in Detroit. Detailed information on instrumentation, survey route design, data processing, and program results is presented. (Author summary modified)

25838 **APTIC NO. 47703**

Economic Planning Agency (Japan), Council for the People s Life

INDICATORS FOR THE READJUSTMENT OF HUMAN ENVIRONMENT. *(Ningen kankyo seibi e no shishin). Text in Japanese. Tokyo, 1971. 247p.*

From the standpoint of creating a new, healthier environment, various present problems and future projects are discussed. The problems include the drastic changes of social and natural environments, the frustrations and dissatisfaction of the people, expanding environmental destructions, problems of traffic safety, transformation of work, and living environments. Future projects include the need for a long-term view, planning, systematization of environmental creation, and changes to be made in people s thinking. The drastic increase of pollution by automotive exhausts is one of the serious problems brought about by the increase of the number of automobiles. Of the 870,000 tons of carbon monoxide emitted in Tokyo, 99.7% comes from automobiles, 35.9% of the 178,000 tons of nitrogen oxides comes from automobiles (63.5% from industrial sources), and 97.9% of the 185,000 tons of hydrocarbons is emitted by automobiles. In some areas of Tokyo, where traffic is heavy, the amount of CO is expected to grow 1.3 times by 1980, and the amounts of NOx and HC are also expected to multiply by 1.8 times.

25839 **APTIC NO. 47516**

Bartosh, C. Patrick and James G. Noblett, Jr.

STATEWIDE EMISSIONS INVENTORY FOR THE STATE OF ARKANSAS. (FINAL REPORT). *Radian Corp., Austin, Tex., Office of Air Programs APTD- 0795, 120p., Aug. 31, 1971. 14 refs.*

NTIS: PB 210038

A statewide emissions inventory is presented for Arkansas. Data on fuel combustion, refuse disposal, point and area sources, and emissions of sulfur oxides, particulates, carbon monoxide, nitrogen oxides, and hydrocarbons and their derivatives were collected and incorporated into a grid system. State totals for emissions were estimated at 239,640 tons of particulates; 44,317 tons of sulfur dioxide; 1,018,750 tons CO; 260,771 tons of hydrocarbons; and 130,439 tons NOx annually. The major emission sources were residential, commercial, and institutional fuel combustion, industrial process losses, steam-electric power plants, incineration and open burning of refuse, dry cleaning, and transportation. (automobiles, railroads, aircraft, and vessels).

25840 **APTIC NO. 47528**

Blackard, Wayne A.

AIR POLLUTION REPORT -- FEDERAL FACILITIES. METROPOLITAN MINNEAPOLIS-ST. PAUL INTRASTATE AIR QUALITY CONTROL REGION. *Air Pollution Control Office, Rockville, Md., Federal Facilities Branch, APTD-1005, 26p., Feb. 1971. 7 refs.*

NTIS: PB 209674

The Metropolitan Minneapolis-St. Paul Intrastate Air Quality Control Region is located adjacent to the Minnesota-Wisconsin borders and consists of seven counties. There are 75 Federal installations within the region; 28 are involved in burning either fossil fuels (oil, gas, or coal) or refuse (incineration or open burning). The installations emit annually a total of 700 tons of sulfur oxides, 370 tons of nitrogen oxides, 86 tons of carbon monoxide, 65 tons of particulates, and 19 tons of hydrocarbons. Identifiable annual aircraft emissions are estimated at 870 tons CO, 165 tons HC, 50 tons NOx, and 20 tons of particulates. There are three point sources in the area which emit more than 100 t/yr of any one pollutant. The area abatement program is mentioned. (Author abstract modified)

25841 **APTIC NO. 47449**

Decaux, Jacques, Jean-Claude Gaillard, and Claude Paul

MANUFACTURE OF CARBON MONOXIDE AND NITROGEN FROM LOW BOILING PETROLEUM FRACTIONS. *(Verfahren zur gleichzeitigen Erzeugung von Kohlenoxyd und Inertgas aus Kohlenwasserstoffen). Text in German. (Azote et Produits Chimiques S. A., Toulouse (France) and Onia-Gegi, Montrouge (France)) W. Ger. Pat. Appl. 2,151,816. 12p., Oct. 18, 1971. (3 claims).*

A gas containing 17% carbon dioxide, 20% carbon monoxide, 20% hydrogen, 42% nitrogen, and 1% methane was manufactured by partial oxidation of 700 kg/hr petroleum with 2500 cu m/hr air in the presence of steam and a nickel catalyst. The CO2 and CO were removed by absorption with aqueous potassium carbonate and ammoniacal copper acetate, respectively. Subsequent desorption gave 1000 cu m/hr CO and CO2, which was recycled to the reaction chamber. The residual gas was burned with air and the combustion completed over a nickel-platinum catalyst to give 4000 cu m/hr gas containing 99.5% N.

25842 **APTIC NO. 47527**

Dennison, William

AIR POLLUTION REPORT -- FEDERAL FACILITIES. METROPOLITAN STEUBENVILLE INTERSTATE AIR QUALITY CONTROL REGION. *Air Pollution Control Office, Rockville, Md., Federal Facilities Branch, APTD-0995, 20p., Jan. 1971. 7 refs.*

NTIS: PB 209701

The Metropolitan Steubenville Interstate Air Quality Control Region includes four counties in Ohio and four counties in West Virginia. There are 48 Federal installations within the region; 23 are involved in burning either fossil fuels (coal, oil, and gas) or refuse (open burning and incineration). The emissions from the federal facilities total 11 tons of sulfur oxides, 4 tons of nitrogen oxides, and 1 ton of carbon monoxide annually. (Author summary modified)

25843 **APTIC NO. 47530**

Dennison, William

AIR POLLUTION REPORT -- FEDERAL FACILITIES. METROPOLITAN BIRMINGHAM INTRASTATE AIR QUALITY CONTROL REGION. *Air Pollution Control Office, Rockville, Md., Federal Facilities Branch, APTD-0993, 21p., Jan. 1971. 7 refs.*

NTIS: PB 209677

The Metropolitan Birmingham Intrastate Air Quality Control Region encompasses six counties in Alabama. There are 41 Federal installations within the region; 12 burn either fossil fuels (oil, coal, gas) or refuse (incineration and open burning). Their contribution to the air pollution problem totals 14 tons of sulfur oxides, 12 tons of nitrogen oxides, 9 tons of particulates, 7 tons of carbon monoxides, and 2 tons of hydrocarbons annually. The abatement program for the area is mentioned. (Author abstract modified)

25844 **APTIC NO. 47549**

Fox, Raymond D., Harry V. Geary, Jr., and Robert N. Swanson

STATEWIDE EMISSION INVENTORY OF WYOMING. *GCA Corp., Bedford, Mass., Technology Div., Office of Air Programs Contract 68-02-0041, GCA-TR-71-6-G, APTD-0801, 82p., Aug. 1971. 27 refs.*

NTIS: PB 210430

An emission inventory is presented for Wyoming. Emissions from all pollutant source categories are totalled for each of of the air quality control regions and for the three principal urban centers. All commercial, institutional, and industrial point sources with reported emissions, sour gas combustion at oil fields and refineries, and open burning of petroleum sludges primarily at oil fields are treated separately. A primary source of particulate emissions was process losses from industrial point sources and coal combustion. Coal combustion, sour natural gas, residual oil combustion, and industrial process losses are the major sources of sulfur dioxide emissions. Emissions of carbon monoxide and hydrocarbons originate from three sources: automobiles, on-site incineration, and industrial process losses. Emissions of nitrogen oxides are attributed to automobiles, sour natural gas burned at oil fields and refineries, and coal combustion. (Author summary modified)

25845 **APTIC NO. 47534**

Mitchell, E. R.

INVENTORIES OF NATIONAL AND INDIVIDUAL AIR POLLUTION. *In: Inventories of National and Individual Air Pollution. Dept. of Energy, Mines and Resources, Ottawa (Ontario), Fuels Research Centre, Mines Branch Inform. Circ. 269, 17p., June 1971. 5 refs.*

The dilemma is that there are still enough mineral resources in the world to support an expanding technological way of life, but the air and water of our environment do not have the capacity to accept the resulting wastes. Canadian fuel consumption is tabulated for 1946 and 1969 in relation to population and the gross national product. To illustrate the advances in fuel and combustion technology, examples of fuel use for domestic heating, commercial, and industrial steam are described. An efficiency guide for coal-fired stoker boilers is presented, as well as typical performance data for minimum pollution emissions shop-fabricated fire-tube package boilers. The actual thermal efficiency of steam boilers and high temperature water generators was measured for minimum pollutant emissions. Population density and distribution figures are presented for various countries. The national inventory of air pollution from fuel combustion is included. The amount of carbon dioxide, nitric oxide, carbon monoxide, particulates, sulfur dioxide, and sulfur trioxide emitted from the combustion of various fuels, including natural gas, gasoline, coal, oil, and diesel fuel, is tabulated. Individual pollution inventories are given for pollutants from fuel combustion, smelting, electricity production, automobiles, aircraft, and other sources.

25846 **APTIC NO. 47474**

Williams, K. R. and N. Van Lookeren Campagne

SYNTHETIC FUELS FROM ATMOSPHERIC CARBON DIOXIDE. *Preprint Shell International Petroleum Co., Ltd., London (England) and Shell International Petroleum Maatschappij N. V., The Hague (Netherlands), 11p., 1971. 5 refs.*

Hydrogen, produced by the electrolysis of water, plus carbon dioxide produce methanol in a catalytic reaction. Processes and economics to manufacture non-fossil methanol and Fischer-Tropsch gasoline using this reaction are discussed. It might be possible to extract carbon dioxide directly from the atmosphere by compressing air, condensing the water in it, drying the resultant air with a molecular sieve, and extracting the CO2 by another sieve. However, costs for compressors would be enormous. Other sources of CO2 include stack gases from power stations and from chemical processing and calcining limestone rock to produce quicklime (calcium oxide) which would carbonate after exposure to the elements when spread back on the land. The production of liquid synthetic automotive fuels from the CO2/H2O/energy route has little chance to be competitive for a long time, when compared to the present situation. Comparisons between methanol and fossil fuels with futuristic engines such as fuel cell/battery/ electric motor or battery/electric motor show that the best hope for synthetic fuels is in the use of methanol in a fuel cell. Fossil fuels will be used for transport and other forms of portable energy for as long as they are economically available. If the methanol fuel cell is developed, fossil fuels will still remain the most attractive source of fuels for portable use. The high efficiency of the fuel cell will prolong the life of fuel reserves. Ultimately, when nuclear power is the major source of energy, liquid fuels will still be available, albeit at higher prices than now.

1970

25847 **APTIC NO. 47541**

Public Health Service, National Air Pollution Control Administration

DATA REPORT FOR THE DULUTH (MINNESOTA) -- SUPERIOR (WISCONSIN) INTERSTATE AIR QUALITY CONTROL REGION. *APTD-1095, 20p., June 1970.*

NTIS: PB 209784

Designation of an air quality control region is one of the first steps in the regional approach to air pollution control. Data are presented for the Duluth-Superior region, including meteorology, topography, air quality and emission data, population, industrial sources, and jurisdictional aspects, to establish a basis for designating an air quality control region. The major pollutants of concern were suspended particulates and sulfur dioxide. The principal point sources included residential, industrial, and commercial fuel combustion, power plants, refuse disposal, chemical and industrial (mineral and metallurgical) processing, and transportation. Based on the data, the proposed boundaries represent a logically contiguous arrangement of local jurisdictions necessary for mounting a successful air pollution control program.

25848 **APTIC NO. 47472**

Ball, Gwendolyn and Edward A. Boettner

COMBUSTION PRODUCTS OF PLASTICS AND THEIR CONTRIBUTION TO INCINERATION PROBLEMS. *Am. Chem. Soc., Div. Water, Air Waste Chem., Gen. Papers, vol. 10:236-239, 1970. 3 refs.*

Thermogravimetric and differential thermal analysis were used to determine the temperature at which various plastics bread down. Combustion products were analyzed by infrared spectroscopy, gas chromatography, and mass spectrography. Polyphenylene oxide and polycarbonate presented minimal air pollution and incinerator corrosion problems from phenols, carbon dioxide, carbon monoxide, and low-boiling hydrocarbon emissions. Polyimide began to break down at 500 C; it gave off CO2, CO, water, and very little HC. Hydrogen cyanide, cyanogen, benonitrile, nitric oxide, and nitrogen dioxide were produced in small quantities. Polyvinyl chloride produced over 50 products including hydrocarbons and hydrogen chloride. Polysulfone gave off CO2, CO, and sulfur dioxide. The main effect of varying the air supply during plastic combustion was a variation in CO2 and CO production. Higher heating rates resulted in the plastic remaining at 800 C for a longer time before combustion was complete, and favored CO2 production rather than CO.

25849 **APTIC NO. 47498**

Blackard, Wayne A.

AIR POLLUTION REPORT -- FEDERAL FACILITIES. METROPOLITAN CINCINNATI INTERSTATE AIR QUALITY CONTROL REGION. *Air Pollution Control Office, Rockville, Md., Federal Facilities Branch, APTD-0983, 30p., Dec. 1970. 7 refs.*

NTIS: PB 209676

The Metropolitan Cincinnati Interstate Air Quality Control Region encompasses portions of Ohio, Indiana, and Kentucky. There are 75 Federal installations within the region; 31 are involved in burning either fossil fuels (coal, oil, or gas) or refuse (by open burning or incineration). Their contribution to air pollution totals 2700 tons of sulfur oxides, 2400 tons of particulates, 1400 tons of nitrogen oxides, 360 tons of hydrocarbons, and 300 tons of carbon monoxide annually. Abatement measures are mentioned. (Author abstract modified)

25850 **APTIC NO. 47497**

Edlund, Carl

AIR POLLUTION REPORT -- FEDERAL FACILITIES. MILWAUKEE INTRASTATE AIR QUALITY CONTROL REGION. *Air Pollution Control Office, Rockville, Md., Federal Facilities Branch, APTD-1013, 21p., Dec. 1970. 6 refs.*

NTIS: PB 209675

The metropolitan Milwaukee Intrastate Air Quality Control Region is composed of seven counties within Wisconsin. There are 29 Federal installations in the region that burn fuel or refuse, thus contributing to the air pollution of the area. Complete data on amount of fuel (oil, coal, gas) or refuse burned (incineration and open burning) and tons of pollutants emitted are presented. Stationary Federal sources contribute 171 tons of sulfur oxides, 95 tons of nitrogen oxides, 65 tons of carbon monoxide, 156 tons if particulates, and 5 tons of hydrocarbons annually. Federal facilities contributing more than 100 t/yr of any pollutant are treated separately as point sources. Data on mobil source contribution to air pollution are limited to aircraft emissions which total 3 tons of particulates, 612 tons CO, 114 tons of hydrocarbons, and 29 tons NOx annually. The abatement program is mentioned. (Author summary modified)

25851 **APTIC NO. 47488**

Nagel, L. L.

AIR POLLUTION REPORT – FEDERAL FACILITIES. METROPOLITAN BALTIMORE INTRASTATE AIR QUALITY CONTROL REGION. *National Air Pollution Control Administration, Federal Facilities Branch, APTD-1012, 29p., Feb. 1970. 6 refs.*

NTIS: PB 209722

The Metropolitan Baltimore Intrastate Air Quality Control Region consists of 5 entire counties in Maryland and the independent city of Baltimore. The 83 Federal installations within this region were investigated with respect to fuel burning (oil, coal, and gas) and refuse disposal (incineration and open burning) practices, air pollutant emission data, and abatement plans. The installations emit an annual total of 5700 tons of sulfur oxides, 1300 tons of nitrogen oxides, 150 tons of carbon monoxide, 490 tons of particulates, and 60 tons of hydrocarbons, thus contributing slightly more than 2% of the SOx and less than 1% of the particulates and CO emitted from all stationary sources in the area. (Author summary modified)

25852 **APTIC NO. 47503**

Nagel, L. L.

AIR POLLUTION REPORT – FEDERAL FACILITIES. METROPOLITAN PITTSBURGH INTRASTATE AIR QUALITY CONTROL REGION. *National Air Pollution Control Administration, Federal Facilities Branch, APTD-1008, 42p., Feb. 1970. 6 refs.*

NTIS: PB 209787

The Metropolitan Pittsburgh Intrastate Air Quality Control Region includes seven counties in Pennsylvania. Data were collected from the 139 Federal facilities within this region to determine their contribution to air pollution, fuel combustion (oil, gas, and coal) and refuse disposal practices (incineration and open burning), and abatement plans. Air pollutant emissions total 1000 tons of sulfur oxides, 500 tons of nitrogen oxides, 3400 tons of carbon monoxide, 340 tons of particulates, and 550 tons of hydrocarbons, thus contributing a negligible percent of the particulates and SOx and slightly more than 5% of the CO emitted from all stationary combustion and refuse disposal sources in the area. Point sources are treated separately. (Author summary modified)

25853 **APTIC NO. 47496**

Russo, Robert S. and Genaro C. Constantino

AIR POLLUTION REPORT – FEDERAL FACILITIES. METROPOLITAN BOSTON INTRASTATE AIR QUALITY CONTROL REGION. *National Air Pollution Control Administration, Federal Facilities Branch, APTD-0984, 40p., May 1970. 6 refs.*

NTIS: PB 209714

The Metropolitan Boston Intrastate Air Quality Control Region encompasses all of Suffolk County and parts of six other counties in Massachusetts. The 131 Federal installations in the area were assessed with respect to emissions, data on fuel burning and refuse disposal (incineration and open burning), and abatement plans. The total fuel use for the installations is 630 tons of coal, 59 million gallons of residual oil, 1.1 million gallons of distillate oil, and 2700 million cu ft of natural gas. Pollutant emissions total at 11,000 tons of sulfur oxides, 2700 tons of nitrogen oxides, 2300 tons of carbon monoxide, 1000 tons of particulates, and 880 tons of hydrocarbons, annually thus contributing approximately 1.2% of all particulates, 2.6% of all SOx, and 0.23% of all CO emissions in the area as compared to all other sources. (Author summary modified)

25854 **APTIC NO. 47523**

Russo, Robert S.

AIR POLLUTION REPORT – FEDERAL FACILITIES. SAN FRANCISCO BAY AREA INTRASTATE AIR QUALITY CONTROL REGION. *National Air Pollution Control Administration, Federal Facilities Branch, APTD-1006, 37p., March 1970. 6 refs.*

NTIS: PB 209720

The San Francisco Bay Area Air Quality Control Region encompasses nine counties in California. Data were collected on emissions, fuel burning and refuse disposal practices (open burning and incineration) and abatement plans of the 119 Federal facilities in the region. The total fuel use for the Federal installation is 271 thousand gallons of residual oil, 400 thousand gallons of distillate oil, and 11,600 million cu ft of natural gas. Pollutant emissions annually total 40 tons of sulfur oxides, 1100 tons of nitrogen oxides, 30 tons of carbon monoxide, 120 tons of particulates, and 9 tons of hydrocarbons, thus contributing 0.6% of all NOx and negligible percents of the other pollutants when compared to all other sources in the area. Point sources are treated separately. (Author summary modified)

25855 **APTIC NO. 47529**

Russo, Robert S.

AIR POLLUTION REPORT – FEDERAL FACILITIES. METROPOLITAN PROVIDENCE INTERSTATE AIR QUALITY CONTROL REGION. *National Air Pollution Control Administration, Washington, D. C., Federal Facilities Branch, APTD-1000, 28p., June 1970. 6 refs.*

NTIS: PB 209719

The Metropolitan Providence Interstate Air Quality Control Region encompasses portions of Barnstable, Bristol, Norfolk, Plymouth, and Worcester counties in Massachusetts and all of Rhode Island. The contribution of the Federal facilities within this region to air pollution is examined. Emissions, data on fuel burning and refuse disposal (incineration and open burning), and abatement plans are evaluated. The total fuel use for the Federal facilities in the region is 29 million gallons of residual oil, 58 million gallons of distillate oil, and 639 million cu ft of natural gas. The facilities emit a total of 5000 tons of sulfur oxides, 1800 tons of nitrogen oxides, 9800 tons of carbon monoxide, 670 tons of particulates, and 2100 tons of hydrocarbons annually, constituting 3.6% of all SOx, 2.2% of all CO, and 2.8% of all particulate emissions as compared to all other sources in the region. The abatement programs for the area are mentioned. (Author summary modified)

25856 **APTIC NO. 47436**

Winiarski, Lawrence D., Bruce A. Tichenor, and Kenneth V. Byram

A METHOD FOR PREDICTING THE PERFORMANCE OF NATURAL DRAFT COOLING TOWERS. *Environmental Protection Agency, Corvallis, Oreg., Pacific Northwest Water Lab., Proj. 16130 GKF, 78p., Dec. 1970. 7 refs.*

GPO

A method is developed for analyzing the performance of counterflow and crossflow natural draft cooling towers that does not assume saturated air at the top of the packing. Types of cooling towers and the principles of operation are considered. Simplified differential equations for heat and mass transfer relations and the methods of integrating them for both counterflow and crossflow towers are given. A large number of intergration steps are unnecessary. Equations are also given for estimating pressure losses in the tower. Simplified flow charts using these integration schemes show how the computer program is used to evaluate tower performance. The computed performance of towers of various heights operating in moist and dry conditions is shown. The effect of inlet water temperature is significant. Finally, the computed performance of a given tower with fixed inlet water temperature is shown as a function of relative humidity and dry bulb air temperature. (Author abstract modified)

25857 **APTIC NO. 47532**

Young, Gary D.

AIR POLLUTION REPORT -- FEDERAL FACILITIES. PHOENIX-TUCSON INTRASTATE AIR QUALITY CONTROL REGION. *National Air Pollution Control Administration, Federal Facilities Branch, APTD-0999, 44p. May 1970. 6 refs.*

NTIS: PB 209718

The Phoenix-Tucson Intrastate Air Quality Control Region consists of five counties in Arizona. Data were collected on the 158 Federal facilities in the region to determine their contribution to air pollution, data on fuel burning (coal, oil, and gas) and refuse disposal practices (incineration and open burning), and abatement plans. Emissions total 8 tons of sulfur oxides, 1500 tons of nitrogen oxides, 22,000 tons of carbon monoxide, 2400 tons of particulates, and 1300 tons of hydrocarbons annually. These emissions are mainly attributed to the airplane traffic at the three Air Force bases in the region. Point sources are treated separately. (Author summary modified)

CONTROL METHODS

1972

25858 **APTIC NO. 47341**

Hitachi Plant Construction Co., Ltd. (Japan)

NEW DUST COLLECTOR FOR CUPOLA FURNACE. *(Kyupora-yo shingata shujin sochi). Text in Japanese. Kankyo Sozo (Environ. Creation), 2(10):72-73, Oct. 1972.*

A new and unique dust collector utilizing a static electric mat filter especially designed for a cupola is introduced. It combines static electricity, a mat filter, and a scrubber. Since cupola flue gas contains minute particles of fume, static electricity helps form larger particles instantly and adsorbs particles onto electrodes. The dusts are washed down by sprays. There are two layers of mat filters above the electrode sprays. The mat filters are packages of mesh filters, through which the already cleaned gas is sucked. Clogging of mesh is prevented by two more levels of sprays. Sulfur dioxide, chlorine, ammonia, and fluorine are also absorbed, and caustic soda solution in the spray water helps desulfurization action. The mist created by these sprays is eliminated by a demister layer above the mat filters. Clean air goes out from the stack at the top. A pilot plant was tested for 6 months; the first plant was constructed in August. The gas containing 0.2 g/N cu m of dusts at the exit of the cupola is cleaned to 0.08 0.12 g/N cu m. The construction and operation costs are also extremely favorable compared to other types of dust collectors for cupola.

25859 **APTIC NO. 47372**

COAL GASIFICATION PLANTS MAY BE SOLUTION TO U. S. GAS SHORTAGES. *Can. Petrol., 13(9):68-69, Sept. 1972.*

Koppers Co., Inc. has acquired the North American license for the design and building of Koppers-Totzek coal gasification plants. Raw materials for the K-T process are low-moisture pulverized coal (any type from anthracite to lignite), oxygen, and steam. The immediate product is a carbon monoxide and hydrogen-rich raw gas, which is cooled and washed before treatment for any of several end uses. After sulfur removal, low BTU gas for industrial fuel and power generators is available. After acid gas removal, a gas suitable for ore-reduction is obtained. If carbon monoxide conversion and carbon dioxide removal are performed on the product at this stage, synthesis gas for several processes is available, and, if necessary, the CV of the fuel can be stepped up at this point to yield substitute natural gas with a CV of 950-1000 BTU/CF. The latter upgrading can be achieved by methanation, ensuring that there is a slight excess of hydrogen in the final pipeline gas to eliminate toxicity from carbon monoxide. No definite price structure has been laid down for the pipeline gas, but it is expected to cost $1.25-$1.35/Mcf. Advantages of the system include the absence of atmospheric pollutants and the prospect of an immediate short-term relief from U. S. gas shortages.

25860 **APTIC NO. 47378**

IS THIS A BREAKTHROUGH IN BLACKTOP TECHNOLOGY? Mine Quarry, 1(5): 5, 7, 9, Sept. 1972.

A new, dust-free coating process has been developed and is undergoing final tests. A prototype plant incorporates the new coating concept which is entirely different from present processes. Cold damp aggregates are associated with bituminous binders and subsequently heated, producing a high quality product. The mix constituents are exactly the same as those used in conventionally produced materials, but give a better performance. All the fine particles normally emitted as dust are retained within the mix throughout the process.

25861 **APTIC NO. 47382**

EMISSION CONTROL DEVICES COMPLICATE ENGINE DESIGN. *Prod. Eng., 43(9):28-29, Sept. 1972.*

To meet 1973 emission requirements, automobile engines will have between four and six separate control systems. Hydrocarbons and carbon monoxide are controlled by regulation of fuel-air ratio and ignition timing, positive-closed ventilation valve, fuel emission control system, transmission controlled spark, air injection reactor, and carburetor hot air. Nitrogen oxides are controlled by exhaust gas recirculation (EGR). However, EGR, impairs driveability, fuel economy, and performance. To maintain both reduced emissions and acceptable performance, the EGR valve must be properly adjusted and controlled by additional components. The EGR during various engine cycles and cold start is discussed.

25862 **APTIC NO. 47427**

PERRIS SMOGLESS AUTOMOBILE ASSN. *Ind. Res., 14(9):52-55, Sept. 1972.*

The Perris Smogless Automobile Association, a group of individuals, have conceived, built, and run a pollution-free internal combustion vehicle based on a cryogenic hydrogen/oxygen fueling system. A 1950 Studebaker was converted to the H2/O2 system and tested. A recirculation invention was developed to remove and reuse the excess hydrogen necessary to obtain smooth operation. The H2/O2 system produced only water. A Food pickup truck was tested and gave a fuel consumption rate of 35 km/kg H2. A 1930 Model A was also tested and had fuel economy less costly than gasoline. The top speed was limited to 40 mph; there was some, but poor, hill climbing ability.

25863 **APTIC NO. 47438**

PART II--SELECTING EQUIPMENT FOR DUST COLLECTION FROM ROTARY LIME KILNS? Rock Prod., 75(8):66-69, 93-94, Aug. 1972.

Specifications and cost estimates are presented as a guide to the selection of fabric collectors and wet scrubbers for rotary lime kilns. Operating conditions are given for small, medium, and large fabric collectors or baghouses. Kiln capacity, process weight, kiln outlet gas flow, temperature, and percentage of moisture, filter inlet and outlet loading, and efficiency are included. Pressure-drop values, cooling requirements, filtration area, air-to-cloth ratio, insulation, and fabric replacement are mentioned. Three sizes of scrubbers are also considered for each of two levels of efficiency. A multistage dynamic scrubber and a venturi-type scrubber are considered, including the proper location of the primary exhaust fan if a venturi-type scrubber is used.

25864 **APTIC NO. 47515**

Southern Research Inst., Birmingham, Ala.

A STUDY OF RESISTIVITY AND CONDITIONING OF FLY ASH. (FINAL REPORT). *Office of Air Programs Contract CPA 70-149, EPA- R2-72-087, 153p., Feb. 1972. 53 refs.*

NTIS: PB 212607

The electrical resistivity of fly ash is one of the most important parameters that controls the efficiency of fly ash removal in coal burning power stations by the use of electrostatic precipitators. The injection of sulfur trioxide or sulfuric acid gaseous conditioning agent to reduce high electrical resistivity was investigated. Fly ash resistivity was determined in situ; coal, flue gases, and fly ash with injected SO3 and H2SO4 concentrations of up to 50 ppm were analyzed. Conditioning by H2SO4 as produced naturally during the burning of coal was also studied. The use of ammonia and water conditioning agents was investigated in further experiments. Various capital and operating costs in existing injection facilities were analyzed. (Author abstract modified)

25865 **APTIC NO. 47662**

HUMAN BEING AND ENVIRONMENT. *(Der Mensch und seine Umwelt). Text in German. Gesundheitstech., no. 11:237-239, Nov. 1972.*

The chemical processes performed by BASF enterprises required special air cleaning methods. Since 1950 the air pollution situation has considerably improved because of the amelioration of production procedures and the increasing use of fuel oil instead of coal. Presently there are only three big power generating plants at BASF which are equipped with modern electrostatic filters. The application of these filters reduced the dust and ash emission to less than 0.15 g/cu m air. A further reduction of the dust emission was reached by using petrochemical substances instead of carbides for the production of acetylene gas. Dry cleaning devices, cyclones, tissue filters, electrostatic filters, and wet cleaning devices have been assembled in many areas of the BASF so that the dust emission at the BASF works at Ludwigshafen is below the legal limit for urban areas.

25866 **APTIC NO. 47665**

AT THE SCIENCE AND TECHNOLOGY COUNCIL OF THE USSR MINISTRY OF ENERGY. TESTING OF A COMBINED ASH-TRAPPING SCHEME. *(V nauchno-tekhnicheskom sovete Minenergo SSSR. Ispytaniye kombinirovannoy skhemy zoloulavlivaniya). Text in Russian. Energetik (Moscow), no. 9:36, Sept. 1972.*

Basic parameters of a combined ash trapping scheme being tested at a 300 MW unit of a power plant firing high-ash coal are presented. The combined ash trapping facility is composed of a wet-type venturi for retaining 90% of the ash and for cooling the flue gas to 75-80 C. The wetted flue gas carrying ash with reduced electric resistivity is then admitted into an electrostatic precipitator at a rate of 2.5 m/sec; the residence time within the precipitator is 4 sec. The electrostatic precipitator has an efficiency of 99-99.5%. The ash trapping capacity of another electrostatic precipitator used in combination with a cyclone battery previously was not satisfactory as a result of reverse corona effect on the collecting electrode due to the resistivity of the trapped ash being too small.

25867 **APTIC NO. 47712**

COAL-TO-GAS PILOT PLANT. *Mines Mag. (Denver), 62(10):4-6, 8, 10, Oct. 1972.*

Dedication of a coal degasification plant at Rapid City, South Dakota, on August 18, 1972, marked the beginning of an important new phase of producing a workable process for turning our most abundant energy resource into a clean, convenient fuel. In the Consolidation Coal Company s carbon dioxide acceptor process, lignite is ground, dried, and fed into a gasifier where, under pressures of 150-300 lbs/sq in.; it is heated in the presence of steam to 1500 F. Dolomite or crushed limestone, preheated to 1900 F in the regenerator and is fed into the top of the gasifier. The limestone particles filter down through the gasifier furnishing the heat because of the high temperature and by a unique chemical reaction, in which the dolomite absorbs carbon dioxide. The spent dolomite and carbon residue are circulated to the regenerator where the dolomite is regenerated, using heat from the burning of carbon. The gases released by heat and chemical reaction between steam and coal in the gasifier represent the final product containing all the ingredients needed to make pipeline gas. The gases are cooled and cleaned. All sulfur, ash, liquids, and solids are removed so there is no air or water pollution. Only methanation is then required as the final step in producing pipeline quality gas. The CO2 acceptor process plant at Rapid City is described. Costs are indicated.

25868 **APTIC NO. 47731**

Central Council for Pollution Countermeasures (Japan)
Planning Committee

A PROGRESS REPORT ON A LONG-TERM VIEW OF ENVIRONMENTAL PROTECTION. (DRAFT). *(Kankyo hozen choki bijon chukan hokoku (an)). Text in Japanese. 94p., 1972 (?).*

The direction of environmental science technology in the future is examined. All the technical aspects of pollution control should be almost completely developed (excepting the areas of life sciences) by 1985. Treatment technology for air and water pollution is expected to be developed relatively early. But those pollutions that offend sensitivity more or less, such as noise, vibration, and bad odor, may not be controlled until later. An effective carbon monoxide elimination device is expected to be developed by 1977, and so is an economical elimination system for hydrogen fluoride; an economical catalyst for nitrogen oxides from fixed sources is expected to be realized by 1978; and pollutionless community cars (small and safe individual transportation means) will be developed by 1978. The development of process conversion methods and recycling systems will be relatively slow. Protection technology for the natural environment and analyses of pollutant influences on human bodies will be even slower. Selecting sulfur dioxide and paper pulp BOD pollution as study cases, the futures of control techniques and economic feasibility were examined. It was concluded that these problems will be solved by 1985.

25869 **APTIC NO. 47777**

BISCHOFF METHOD DEVELOPMENT PROJECT. *(Entwicklungsvorhaben Bischoff-Verfahren). Labor and Social Ministry of North Rhine- Westphalia, Duesseldorf (West Germany) and State Inst. for Immission Control and Soil Conservation, Essen (West Germany), 30th Interim Rept., June 1972. Translated from German. Translation Consultants, Inc., Arlington, Va., 5p., 1972.*

New parts and equipment modifications to a Bischoff desulfurization installation are described, as well as results from sludge tests. Tentative experiments in converting the sludge with residual sulfuric acid showed good setting of the gypsum obtained with ferrous sulfate-free acids. Acids contaminated by FeSO4 decreased the setting quality of the product.

25870 **APTIC NO. 47617**

Abe, Saburo and Shosuke Miyamoto

DESULFURIZATION METHOD OF WASTE GAS. *(Hai gasu no datsuryu hoho). Text in Japanese. (Toyo Kogyo Co., Ltd. (Japan)) Japan. Pat. Sho 47-43737. 4p., Nov. 6, 1972. (Appl. April 18, 1968, 1 claim).*

A scrubber-type desulfurization method for high-temperature waste gas is described. This method performs the cooling of the hot gas at two stages, the first precooling and the second, so that the gas temperature may be lowered adequately for scrubbing with an ammonia water solution for effective desulfurization. The distinctive feature of this invention consists of the cooling system, especially in the first stage cooling device, where hot waste gas from a boiler is cooled through heat exchange with the treated waste gas flowing to the chimney. Cooled twice and then scrubbed with the ammonia water solution at the scrubber of the system, the treated gas is very cool and therefore disadvantageous for atmospheric diffusion. The heat-conductive pipeline through which this low-temperature treated gas flowing to the chimney runs through the first precooling chamber, thus cooling the untreated hot gas while heating the treated gas itself at the same time. Thus, no water is used at the first-stage cooling. The second-stage cooling is performed by water circulating through the pipeline. Cooled in the two stages, the temperature of the waste gas is below 50 C or often as low as 40 C, the temperature range low enough to permit scrubbing with the ammonia water solution. Since the gas is not directly exposed to the cooling water for cooling purposes, this method also assures a higher recovery rate of ammonium sulfate. With the direct cooling method in which the waste gas is directly exposed to the cooling water, the recovery rate amount to only 42% of that assured by this method.

25871 **APTIC NO. 47348**

Apakhov, I. A., N. V. Inyushkin, E. A. Kravchenko, L. I. Bulycheva, G. F. Shakhov, A. Ye. Goncharov, A. N. Cemenov, and G. A. Usov

SCRUBBING OF SULFURIC ACID MIST WITH THE AID OF INDUSTRIAL ELECTROFILTER. *(Ulavlivaniye tumana sernoy kisloty v promyshlennom elektrofil tre). Text in Russian. Khim. Prom. (Moscow), no. 9:676-678, 1972. 11 refs.*

The removal sulfuric acid mist formed during sulfuric acid production by means of electrostatic precipitators was studied in pilot plant experiments. Such waste gases usually contain 400-1500 mg of H2SO4/cu m, 0.002% of nitrogen oxides, and sulfur trioxide. The H2SO4 mist previously treated in absorbers and wetted with 0.1-0.3 g of steam/cu m was admitted into an electrostatic precipitator with a needle-type corona discharge electrode of lead at a flow rate of about 1 m/sec and at a temperature of 40-50 C. The DC voltage was 46-50 kV with a fairly constant linear current density of 0.25-0.29 mA/m. The efficiency obtained for initial H2SO4 concentrations of 400-2000 mg/cu m was 96-98%, and the discharged gas was invisible. Increased gas flow rate resulted in slight drop in efficiency, and corona discharge electrodes in the form of a six-pointed star proved not to be applicable. The condensate obtained contained H2SO4 of 92% concentration, and 0.3-0.8% of nitrous anhydride.

25872 **APTIC NO. 47713**

Archer, G. A. and K. B. Whitwam

INCINERATOR GAS CLEANING AND ITS IMPACT ON PLANT DESIGN. *Filtration Separation (Purley), 9(5):553, 555, 557-561, Sept./Oct. 1972. (Presented at the Filtration Society, Symposium on Prevention of Air Pollution from Incineration, Manchester, England, Jan. 18, 1972; includes a discussion.)*

There may be some justification for a more universal approach in deciding the quantity of solids which may be discharged to the atmosphere from continuous grate incinerators dealing with municipal refuse and trade wastes. In Great Britain, the degree of cleaning required on municipal refuse incinerator plants involves the use of electrostatic precipitators preceded by a spray cooling tower. The influence imposed by the gas cleaning plant on the general design and layout of the incinerator plant is primarily one of space required for the cooling chamber, cleaning equipment, induced draught fans, and all the ancillary equipment comprising duct-work, dampers, instruments, electrical controls, pumping equipment, and dust removal systems. Gas cooling, discharge of untreated gases, the electrostatic precipitator, sludge incineration, dust/gas sampling, dust disposal, dust removal, the induced draught fan, and atmospheric dust extraction are reviewed.

25873 **APTIC NO. 47421**

Bhatia, S. P. and S. Prahacs

REMOVAL OF SULPHUR COMPOUNDS FROM KRAFT RECOVERY STACK GASES WITH ALKALINE SUSPENSIONS OF ACTIVATED CARBON. PART 1: LABORATORY INVESTIGATIONS. *Pulp Paper Mag. Can. (Quebec), 73(10):66-73, Oct. 1972. 14 refs. (Presented at the Canadian Pulp and Paper Association, Air and Stream Improvement Conference, 6th, Quebec, April 13-15, 1971, Paper T266.)*

Alkaline suspensions of activated carbon were tested with simulated kraft recovery furnace stack gases as a process for removing hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide. The cost of carbon for removing 90% of the total reduced sulfur compounds, at an original sulfur emission rate of 20 lb/t of pulp, would be 3-6 cents/t of pulp, with a possible decrease in costs if less sulfur is removed, if the activated carbon is produced on-site from black liquor, or if fly ash carbon of sufficient activity is available at the mill. Experimental procedures, apparatus, and laboratory results are examined. The results suggest that the use of sodium carbonate plus powdered activated carbon for scrubbing kraft recovery stack gases would be both economically and technologically feasible. (Author abstract modified)

25874 **APTIC NO. 47620**

Brand, Hans-Dieter

CLEANING OF ODOROUS WASTE AIR BY THERMAL AND CATALYTIC AFTERBURNING. *(Reinigung geruchsbelaestigender Abluftstroeme mit Hilfe der thermischen und katalytischen Verbrennung). Text in German. Wasser Luft Betrieb, 16(10):351-355, 1972.*

The odorous components of industrial waste air are almost exclusively hydrocarbons. They can be oxidized to carbon dioxide and water by thermal and catalytic afterburning. The principles of these two methods are reviewed. The investment costs of thermal and catalytic plants for cleaning an equally large air volume do not differ much. The costs for the catalyst are balanced by the costs of heat resistant material required for thermal plants. If the plants are equipped with heat exchangers the investment costs for smaller plants (2000 cu m/hr) amount to \$5.00/cu m/hr for larger plants (30,000 cu m/hr) to \$3.50/cu m/hr. The operating costs amount to between \$.36-.27/1000 cu m/hr for catalytic afterburners and to between \$.55-.36/1000 cu m/hr for thermal afterburners. Part or all of the operating costs can be recovered by returning the cleaned air to a drier.

25875 **APTIC NO. 47304**

Brion

AERAULIC AIR POLLUTION CONTROL DEVICES FOR INDUSTRIAL PLANTS. *(Les moyens de lutte mis a la disposition des industriels par les fabricants par separation aerolique). Text in French. Colloq. Int. Homme, Air Eau, Paris, France, 1972, 12p. (June.)*

Various types of dust separators available for industrial air pollution control purposes are reviewed. Gravitational settling chambers have the disadvantages of large volume and of satisfactory efficiency for only coarse particles. Inertial dust separators with baffle plates apply dust removal by means of vibration or water spray. Centrifugal dust separators (cyclones and multicyclones) have good efficiency for a minimum particle diameter of about 10 micron and pressure losses ranging

27<

from 10 to 100 mm water column. Dust filters using fiber materials, granules, or Raschig rings combine multiple effects such as those of screen, direct interception, inertia, diffusion, and electrostatic effects, in themselves. Hydraulic dust separators such as bubbling, spray, and venturi scrubbers are described. The efficiency of electrostatic precipitators is dependent on such factors as the electric field characteristics, the pattern of gas flow within the electric field, and the electrical charge and resistivity of the dust particles.

25876 **APTIC NO. 47483**

Chipman, John C., John Y. Chao, Ray M. Ingels, Roy G. Jewell, and Wendell F. Deeter

FIELD TEST OF AN EXHAUST GAS RECIRCULATION SYSTEM FOR THE CONTROL OF AUTOMOTIVE OXIDES OF NITROGEN. *Preprint, Society of Automotive Engineers, Inc., New York, 12p., 1972. 10 refs (Presented at the Society of Automotive Engineers, National Automobile Engineering Meeting, Detroit Mich., May 22-26, 1972, Paper 720511.)*

The efficiency of a vehicle exhaust gas recirculation system for the control of nitrogen oxide emissions was evaluated in an extensive field test program. The system used hot exhaust gases from the crossover and included certain modifications to the carburetion, choke, and crankcase ventilation system. It was tested on two fleets of automobiles equipped with hydrocarbon and carbon monoxide emission control devices; exhaust emissions, fuel consumption, and effects on vehicle drivability, engine deposits, wear, and oil deterioration were studied. Experimental procedures and results are discussed. (Author abstract modified)

25877 **APTIC NO. 47379**

Ciukaj, Thomas V.

U. S. STEEL S NEWEST BOP SHOP AT LORAIN. *J. Metals, 24(3):43-45, March 1972.*

Improvements in the Lorain steel works included the construction of a basic oxygen shop equipped with high performance air and water pollution control equipment. The gas cleaning system limits the burning of combustible gases in the hood. The system includes completely separate ductwork, fans, and stacks for each vessel, permitting simultaneous blowing. The variable venturi opening maintains the set point standard cu ft/min at the fan. At least 50% excess air enters to burn the carbon monoxide. A movable skirt minimizes the opening between the hood and the vessel during the blow and limits the air drawn into the hood. Gas is cooled and scrubbed by conventional means, utilizing the quencher section to cool the gases and remove the larger particles.

25878 **APTIC NO. 47533**

Clark, Walter E. and W. Fulkerson

SURVEY OF THE MERCURY REPROCESSING INDUSTRY - 1968-1970. *Oak Ridge National Lab., Tenn, National Science Foundation RANN Program Interagency Agreement AAA-R-4-79, ORNL NSF-EP-22, 14p., Oct. 1972.*

Concern over mercury pollution emphasizes the desirability of concentrating and recovering used mercury whenever possible. Recovery also conserves irreplaceable supplies of mercury. The mercury reprocessing industry was surveyed by questionnaire to give a better understanding of the technology and economics of the problems of recycling. The decrease in the price of mercury (from $6.50/lb in 1969 to $3.33/lb in 1971 to $1.80/lb as of April 1, 1972) has discouraged the recovery of scrap; in 1971, however, this trend was offset by the increased emphasis on keeping mercury out of the environment, which resulted in an increase of mercury recycling. Sources of scrap are instrument and electrical manufacturers, research laboratories, batteries, dirty mercury, residues, the Atomic Energy Commission, and dental amalgam. The recovery of mercury from the flue gases of municipal incinerators and fossil fuel power plants still requires considerable research, and may never be economically feasible except possible as a part of a larger clean-up scheme.

25879 **APTIC NO. 47441**

Collins, John Joseph, Stephen Alan Conviser, Richard Alan Anderson, and Krishan Dayal Manchanda

PURIFYING HYDROGEN AND HYDROCARBONS BY SELECTIVE ADSORPTION OF IMPURITIES ON ZEOLITIC MOLECULAR SIEVES. *(Reinigung von Wasserstoff und Kohlenwasserstoffen). Text in German. (Union Carbide Corp., New York) W. Ger. Pat. Appl. 2,143,759. 21p., March 9, 1972. 14 refs. (Appl. Sept. 1, 1971, 9 claims).*

The adsorptive capacity of zeolite molecular sieves for the removal of traces of carbon dioxide, water, alkylmercaptans, and various sulfur compounds from olefins can be improved by passing through a stream of paraffins to desorb the olefins and to adsorb additional paraffinic impurities. The bed once free of olefins can be regenerated thermally, avoiding formation of coke and tarry residues in the molecular sieves due to polymerization of olefins. The process is especially suitable for purifying olefin and isoparaffin feedstocks before catalytic alkylation. An example is described, including the pertinent operating variables.

25880 **APTIC NO. 47301**

Devillers

APPLICATIONS OF CATALYSIS IN EXHAUST GAS AND INDUSTRIAL EFFLUENT TREATMENT. *(Applications de la catalyse dans le traitement des pollutions. Gaz d echappement effluents industriels). Text in French. Colloq. Int. Homme, Air Eau, Paris, France, 1972, 18p. (June.)*

Applications of catalysis to the treatment of internal combustion engine exhausts and of industrial waste gases are reviewed. Single-stage catalytic reactors for the oxidation of carbon monoxide and hydrocarbons will be required for automobiles in the U. S. in 1974, and two stages, one for the reduction of nitrogen oxides, and another for the oxidation of CO and hydrocarbons, will be expectedly demanded as of 1976. Recent research in the U. S. focuses on the development of durable reactors and of not too expensive catalysts. Catalytic reactors may be required for European-built automobiles as of 1978-1980. Industrial diesel engines require elevated exhaust temperatures of 400-450 C for the catalytic afterburning of their exhaust gases. It is possible to reduce the CO content to 0-100 ppm, the aldehydes content to 0-3 ppm, and the hydrocarbons content to 0-50 ppm by means of catalytic afterburning of diesel exhaust. Gasoline engines require the same type of catalytic reactor as diesel engines, and also additional oxygen supply, while there is no need for heating the exhaust. Catalytic reactors are able to reduce the CO content to 0-10 ppm, the aldehydes content to 0-5 ppm, and the HC content to 0-50 ppm. Catalytic reactors for liquefied petroleum gas-powered engines, requiring no preheating of the exhaust to be treated, have a minimum life of 1500-2000 hr. The catalytic afterburning of industrial waste gases usually takes place in a temperature range of 300-550 C. Platinum, copper, chromium, and nickel are the best catalysts for such purposes. Dusts, carbon black, metal oxides, metal vapors, chemical contaminants, and condensation products may create catalyst poisoning hazards.

25881 **APTIC NO. 47330**

Diemer, E., J. P. Ribeyre, and Max Tuech

SMOKELESS BURNER AIDS OFFSHORE WELL TESTING. *World Oil, 175(5): 85-86, 88, Oct. 1972. 54 refs.*

A smokeless oil burner capable of disposing of 10,000 bopd of liquid hydrocarbons containing water, mud, and solid particles was proved in actual applications testing high capacity offshore oil wells in such areas as the North Sea. Black smoke emission is eliminated in the Flopetrol Seadragen Burner by use of special nozzles that inject a ring of atomized water into the flame. Design and performance of the burner are discussed.

25882 APTIC NO. 47481

Doelling, R. P., A. F. Gerber, P. M. Kerschner, M. S. Rakow, and F. H. Robinson

ADDITIVES CAN CONTROL COMBUSTION CHAMBER DEPOSIT INDUCED HYDROCARBON EMISSIONS. *Preprint, Society of Automotive Engineers, Inc., New York, 12p., 1972. 17 refs. (Presented at the Society of Automotive Engineers, National Automobile Engineering Meeting, Detroit, Mich., May 22-26, 1972, Paper 720500.)*

The use of gasoline additives to reduce exhaust hydrocarbon emissions was investigated. Two of the compounds tested reduced the increase in HC emissions associated with the accumulation of lead-derived combustion chamber deposits by approximately 50%. A practical combination of these compounds was evaluated in a fleet test which confirmed laboratory engine results. The effects of fuel lead level on the effectiveness of the additive and of the activity of the additive upon established lead-derived combustion chamber deposits were also determined. The additive could function with fuel lead values from 1/2-3 g/gal but would not be capable of modifying established deposits. (Author abstract modified)

25883 APTIC NO. 47345

Fujii, S., K. Konno, K. Maekawa, S. Yoshizawa, K. Kimura, E. Kameko, T. Kato, T. Bizen, O. Minamino, and S. Mikami

STUDIES ON THE SELECTION AND OPERATION STANDARDS OF AIR CLEANING APPARATUS. *(Kuki seijo sochi sentei kijun oyobi shiko kikun ni kansuru kenkyu). Text in Japanese. Kuki Seijo (Clean Air -J. Japan Air Cleaning Assoc., Tokyo), 10(4):49-89, Sept. 1972.*

In order to establish standards for equipment, design, and installation of air conditioning and cleaning systems, basic research was conducted. The selection of criteria for air cleaning apparatuses, installation standards, air leakage, and in-room dust production were studied. The selection of air cleaning apparatuses was based on the desired dust particle size and concentration in the room, the particle size and concentration in the air outside, the particle size and concentration created in the room, various elements for necessary ventilation and other installation factors, and the quantity of air leakage into the building. All are mathematically examined. For the installation of air cleaners, various points are given for installation, maintenance, inspection, and design criteria. Individual studies concerning in-room dust creation and air leakage are presented separately with graphs, charts, and tables.

25884 APTIC NO. 47658

Fujioka, Nobuyoshi

EQUIPMENT FOR UNBURNED GAS COMBUSTION. *(Minen haigasu nensho sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-40005. 2p., Oct. 9, 1972. (Appl. Oct. 20, 1970, 1 claim).*

This combustor was designed to facilitate complete combustion of smoke and to save space for the installation of a large incinerator with a stack. Incompletely burned gas is sent into a cylindrical combustor through small tubes arranged in a circle. Inside the circle of tubes is a small concave dish in the center of which is a burner to which oil is supplied through a small tube from outside the combustor. Combustion air is sent through the small pores on the concave dish from the bottom of the combustor. Another, larger concave dish covers the entire arrangement, leaving a narrow gap between the combustor wall and the dish. The flame formed by the burner will collide in the bottom of the concave dish and mingle with the incompletely burned gas coming from the tubes, and as the mixture rises through the narrow gap between the wall and the concave cover, the gas will burn completely.

25885 APTIC NO. 47316

Giovanni, D. V., P. J. Pagni, R. F. Sawyer, and L. Hughes

MANGANESE ADDITIVE EFFECTS ON EMISSIONS FROM A MODEL GAS TURBINE COMBUSTOR. *Combust. Sci. Technol., 6(1/2):107-114, Sept. 1972. 26 refs.*

The effect of 0.06% by volume of the additive 2-methylcyclopentadienyl manganese tricarbonyl on particulate and gaseous emissions from a model gas turbine engine was studied. The additive increased the total mass of particulate emissions in these combustor experiments, probably by adding manganese oxides to the exhaust. Without the additive, the smallest of the carbonaceous exhaust particles were typically 0(0.1 micron) in diameter. These particles agglomerate into 0(1 micron) structures and are efficient scatterers of visible radiation. With the additive, exhaust particles, composed of manganese oxides and carbon, were 0(0.5 micron) with significant reduction in agglomeration. There were no effect on gaseous nitric oxide emissions and only a negligible decrease in gaseous carbon monoxide emissions. (Author abstract modified)

25886 APTIC NO. 47666

Griem, Michael

NEW PACKING MATERIAL FOR AIR CLEANING. *(Neuer Fuellkoerper fuer die Luftreinigung). Text in German. Wasser Luft Betrieb, 16(11):381-382, 1972.*

Packing material has been used for decades in sorption processes for achieving a high substance transfer within short time. Glass, clay, and Raschig rings have been used. Saddle-shaped bodies were also used for the absorption processes to achieve a large specific contact area. However, the absorption rate was in many cases higher than the diffusion rate of the absorbed molecules from the surface into the interior of the scrubbing fluid. With all conventional packing material the regeneration of the surface of the scrubbing fluid is too slow. A large part of the boundary area between the phases is saturated. Recently thermoplastics have been used as packing material. The number of contact points and obstacles for the scrubbing fluid has become the new criterium of efficiency. The practical result of this new finding are the spiral ring packing bodies, consisting of an endless spiral bent to form a ring. The fact that the plastics cannot be wetted is an advantage with the spiral ring shape. The renewal of the contact area is achieved by dispersion of the scrubbing fluid at the contact points. The described packing material is of great advantage for gas cleaning and dust collection. The pressure loss with this packing material is only 1/4 of that for Rashig rings and conventional packing material.

25887 APTIC NO. 47361

Hagiwara, Akio

APPARATUS FOR PURIFICATION OF FLUE GAS. *(Baien nado no joka sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-36625. 2p. Sept. 14, 1972. (Appl. March 7, 1970, 1 claim).*

A guiding pipe is installed in the emission source where bad odors are discharged. Various chemical wastes are cooled first in a cooling system, then liquefied in a liquidization system, and then sent to a perfume tank. The gas is sent to the flue by a high pressure fan where it joins combustion or other types of emission gases. The gas goes through a diffusion board into a diffusion chamber where water is sprayed on it. Particles are washed into the precipitation tank below. Part of the gas goes through a filter duct is cooled in the cooling system, and goes through a deodorizing chamber. It collides with baffles in the duct. The gas is again cooled in a cooling chamber, and is forced into a large chamber guided by dispersion boards. An electrostatic precipitator collects dusts. Then the gas goes through a coarse fiber filter and a micromesh filter.

25888 **APTIC NO. 47332**

Halstead, C. J.

NITROGEN OXIDES ABATEMENT BY WATER INJECTION. *Preprint, Japan Combustion Research Group, p. 115-119. (Presented at the Combustion Symposium, 10th, Japan, Dec. 1-2, 1972.)*

The effect on nitrogen oxides control of spraying water into gas/ air flames produced by commercially available burners was investigated in an experimental combustion system fired at 90-145 kW. Water injection was achieved by positioning water spraying nozzles immediately upstream of the flames. For a 1:1 ratio by weight of water to fuel, reductions of about 65% in oxides of nitrogen emission were achieved. Increasing the extent of water addition above this level lead to reductions in NOx of 80-90%. However, the injection of water necessitates an increased thermal stack loss. Since water injection does not require extensive equipment, it has a potential for short term NOx control during severe air pollution episodes. (Author summary modified)

25889 **APTIC NO. 47489**

Hansel, James G.

LOW NOX EMISSIONS FROM AUTOMOTIVE ENGINE COMBUSTION. *Preprint, Society of Automotive Engineers, Inc., New York, 12p., 1972. 12 refs. (Presented at the Society of Automotive Engineers, National Automobile Engineering Meeting, Detroit, Mich., May 22-26, 1972, Paper 720509.)*

A wide range of air-fuel ratios and exhaust gas recycle rates were tested in an automotive test engine to determine optimum conditions for reducing nitrogen oxide emissions to a low level. A minimum NOx level of 0.4 g/mi was affected at a rich air-fuel ratio of 12 and a recycle rate of 25%. With this combustion, fuel consumption increased approximately 15% and wide open throttle power decreased about 30%. Combustion in the cylinders was good, and the vehicle operated smoothly. Comparable results were not affected with lean mixtures. The rich mixture with high recycle technique would not meet the 1976 NOx standard, and the increased carbon monoxide and hydrocarbon emissions would have to be controlled by exhause gas treatment. (Author abstract method)

25890 **APTIC NO. 47624**

Harima, Mikio

TECHNIQUES FOR THE TREATMENT OF HYDROGEN SULFIDE GAS AT PETROLEUM REFINERIES. *(Sekiyu seisei kojo ni okeru ryuka suiso gasu shori gijutsu). Text in Japanese. Kankyo Sozo (Environ. Creation), 2(10):21-32, Oct. 1972. 16 refs.*

Various methods of desulfurization at petroleum refining plants, such as gas scrubbing, the MEA process, DEA process, ADIP process, sulfinol method, and selexol process are discussed. The sulfur recovery process is explained. The Stretford method, Takahax method, and IFP process of sulfur recovery yield high purity sulfur in liquid form from the acid gas scrubber. The flue gas containing 1/3 hydrogen sulfide is reacted to the same amount of air and burned in the reaction tower. Part of the gas turns into sulfur dioxide. This SO2 and the remaining 2/3 H2S gas are reacted in the presence of a catalyst. When the ratio of H2S and SO2 in volume grows closer to 2:1, the recovery quantity of sulfur increases and the amount of sulfur emitted in the air will decrease. But when the plant is under a complete control, a slight change in the amount of air will cause a large change in the amount of tail gas, though it does not affect the ratio of H2S:SO2 at the exit of the reactor. Various methods of treating tail gas such as Wellman process, the French IFP process, the Beavon process, soda scrubbing process, the Shell process, and the Thoroughbred process are briefly mentioned.

25891 **APTIC NO. 47486**

Harned, John L.

ANALYTICAL EVALUATION OF A CATALYTIC CONVERTER SYSTEM. *Preprint, Society of Automotive Engineers, Inc., New York, 35p., 1972. 29 refs. (Presented at the Society of Automotive Engineers, National Automobile Engineering Meeting, Detroit, Mich., May 22-26, 1972, Paper 720520.)*

The performance of packed-bed type catalytic converters in controlling hydrocarbon-carbon monoxide mass emissions was investigated using a one-dimensional plug flow math model. Converter operation and the effects of gas stream conditions and basic parameter values on converter emission control performance are evaluated. Total mass emissions passed by the converter during warmup were minimized by maintaining gas mass flow and HC-CO concentrations at low values. Converter warmup performance was highly sensitive to changes in bead diameter and catalyst kinetics, but was relatively insensitive to changes in bed area/length ratio and bed void fraction. Data on the modeling of platinum kinetics, bead temperature stability, and mass and heat transfer j-factors for packed beds are presented. (Author abstract modified)

25892 **APTIC NO. 47366**

Hayashi, Hiroshi

POLICY AND POSSIBILITY ON AUTOMOTIVE EXHAUST PURIFICATION. *(Jidosha haiki joka no taisaku to sono kanosei). Text in Japanese. Rodo no Kagaku (Dig. Sci. Labor), 27:(2, 3)82-87, Feb.-March 1972.*

Basic methods of automotive exhaust purification occur before, during, and after engine operations. For the pre-engine treatment, any pretreatment by adding inactive gas, adding oxygen to the suction air, using improved gas, or secondary air can result only a limited amount of control so long as combustion occurs, because all toxic gases such as carbon monoxide, hydrocarbons, or nitrogen oxides are products of combustion. The potential and limitation of pre-engine treatment are both in the even distribution of fuel in the cylinders and complete carburetion, and adjustment of the combustion condition for each cylinder. The treatment in the engine itself can be by modification of operation or by using an entirely different motor. Among several methods of modification, the most effective methods are the air/fuel ratio, spark timing, and exhaust gas recirculation. As converted engines, stratified charge, two stroke engine, diesel engines, gas injection, rotary engines, gas turbines, and Stirling engines are briefly discussed. The third method is the treatment of engine exhaust gas. The most effective method of controlling exhaust gas at present seems to be engine modification plus exhaust treatment. Thermal reactors, afterburners, catalytic converters, and particulate traps, are briefly discussed.

25893 **APTIC NO. 47484**

Henault, C.

FUEL INJECTION AND EGR ADJUSTMENTS ON THE RENAULT R17 TS. *Preprint, Society of Automotive Engineers, Inc., New York, 7p., 1972. 4 refs. (Presented at the Society of Automotive Engineers National Automobile Engineering Meeting, Detroit, Mich., May 22-26, 1972, Paper 720518.)*

Because of low nitrogen oxide emissions, a version of the Renault R17 TS equipped with a high performance engine was selected for the United States market. The problems of adapting an electronic fuel injection system to a 1600 cu cm engine to meet 1974 standards and the pollution limits for the engine are examined. The major problem was posed by intermediary operating speeds. Hydrocarbon and carbon monoxide emissions, also problematic, were controlled by the fuel injection system and exhaust gas recirculation. Engine specification and modification, performance, and adaption techniques are examined. (Author abstract modified)

25894 **APTIC NO. 47639**

Hirota, Ryuichi, Kishichiro Mizukami, and Kuniyoshi Ooka

IMPROVEMENT OF WET-TYPE FLUE GAS DESULFURIZATION METHOD. *(Shisshiki haien datsuryu hoho no kairyo). Text in Japanese. (Mitsubishi Kakoki Kaisha, Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-46262. 6p., Nov. 21, 1972. (Appl. Dec. 31, 1970, 1 claim).*

In the widely used wet-type flue gas desulfurization process, the caustic soda solution first acts on the carbon dioxide contained in the flue gas to produce sodium bicarbonate, which reacts with the sulfur dioxide to produce sodium bisulfite. The sodium bisulfite is then heated in the regeneration tower and pyrolyzed into sodium sulfite, SO2, and water, after which the sodium sulfite solution is recirculated as the scrubbing solution while the SO2 is recovered as sulfurous acid or material from which to manufacture sulfuric acid. As the solution of sodium sulfite is circulated into the scrubbing tower, SO2 is absorbed by the sodium sulfite solution and reduced to sodium bisulfite, which is again heated in the regeneration tower to produce sodium bisulfite that will be used for absorption of SO2. During this circulation of the absorbent solution, however, sodium sulfate, sodium thiosulfate, and sulfur are produced in the absorbent solution, eventually resulting in incapability of the absorbent to absorb the SO2. Another problem is that crystals of sulfur clog up the pipelines or deposit on the heat exchanger s tubes. This necessitates partial purging of the absorbent and addition of new supply of caustic soda, thus increasing consumption of the caustic soda and lowering the yield rate of SO2. This invention offers solution to these problems, namely, in the regeneration process in which SO2 is recovered by the sodium bisulfite, the temperature is kept below 130 C and concentration of the sodium thiosulfate below 5 wt%.

25895 **APTIC NO. 47414**

Holst, Rudolf and Karl Hermann Koepennik

PURIFYING INDUSTRIAL AND ENGINE EXHAUST GASES WITH CATALYST-CONTAINING HONEYCOMB STRUCTURES. *(Verfahren zur Reinigung von Industrie- und Motorabgasen). Text in German. (Kali-Chemie A. G., Hannover (West Germany)) W. Ger. Pat. Appl. 2,043,031. 8p., March 2, 1972. (Appl. Aug. 31, 1970, 6 claims).*

Catalyst-containing honeycomb structures are described for purifying industrial and engine exhaust gases. The honeycomb comprises parallel passages and is made of poorly crystallized boehmite that has been saturated with platinum, palladium, copper, chromium, or manganese, pressed into shape, dried, and dead-burned at 700-1300 C.

25896 **APTIC NO. 47386**

Hori, Seiichiro, Shikazo Nakagawa, Kaoru Aoki, and Mitsuaki Narita

FLUE GAS DESULFURIZATION METHOD USING POTASSIUM PHOSPHATE AS ABSORBENT. *(Rinsan karien o kyushuzai to suru haien datsuryu-ho). Text in Japanese. (Japan Industrial Technology Co., Ltd.) Japan. Pat. Sho 47-36633. 5p., Sept. 14, 1972. (Appl. Oct. 16, 1969, 1 claim).*

Potassium phosphate solution is used as an absorbent in this method of treating stack gas. The absorbent contains potassium pyrophosphoric acid and potassium hydride, and absorbs sulfur dioxide and sulfur trioxide. After this step, the slurry (pyrophosphoric acid and potassium phosphate) is set and its supernatant liquid is taken and mixed with acidic potassium sulfite solution which is otained from the third processing of this method, and the mixture is circulated back to the first processing. In the second processing, the pyropotassium sulfite in the thick slurry is decomposed into sulfur dioxide and potassium sulfite; the SO2 is recovered; and the slurry is filtered. The potassium sulfate obtained by this filtering is mixed with a calcium compound with an easy reaction, and sulfur dioxide is blown into the sludge. The pH is kept at less than 4.4. Acidic potassium sulfite and gypsum are formed. Gypsum is separated and is recovered as a by-product, and the acidic potassium sulfite solution is circulated back to the second processing.

25897 **APTIC NO. 47344**

Ide, Yasuo and Hideo Higuchi

STACK STRUCTURE. *(Entotsu kozobutsu). Text in Japanese. (Mitsubishi Heavy Industries, Ltd. (Japan)) Japan. Pat. Sho 47-40004. 4p., Oct. 9, 1972. (Appl. Oct. 31, 1970, 1 claim).*

In a previously designed stack structure the stack from an incinerator leaned against the outer wall of a cleaning tower in order to prevent pollution from the stack gas and heat from the cleaning tower. Such a structure, however, could create a downwash phenomenon when the wind blows in the direction of the stack, and a strong wind could cause bad pollution. This invention was designed to eliminate the weakness of the previous design by extending the stack to the top of the cleaning tower and opening a vent there facing upward. Smoke coming out of the vent will be helped by the exhaust gas turbulence from the cleaning tower and will quickly disperse. Under no circumstances will a downwash phenomenon occur. This design can further involve another incinerator and a stack on the opposite side, so that the two stacks will be constructed along the cleaning tower on opposite walls, meeting at the top and having a vent partitioned in the middle opening upward.

25898 **APTIC NO. 47610**

Idemura, Hideo

ECONOMY AND USEFULNESS OF DILUTE SULFURIC ACID-PLASTER METHOD. *(Kityusan sekko ho nu keizaisei to jitsuyo koka). Text in Japanese. PPM (Japan), 3(12):39-44, Dec. 1972.*

Wet-type smoke desulfurization equipment was developed which is adaptable to different types of smoke, can be used on a large scale, works at high speeds, is economical, and yields a chemically stable plaster. An absorption and oxidation process removes sulfur dioxide in the smoke with dilute sulfuric acid. Then the dissolved SO2 is oxidized into sulfuric acid in the presence of an iron catalyst. A calcium compound such as limestone is added to the dilute sulfuric acid to form a plaster. The process can be run in continuously for a long term. No secondary smoke is emitted. The rate of desulfurization is almost 100%. A pilot plant processing 1000 N cu m of smoke/hr was constructed in July 1971 and has been operating for about a year. Four full-scale plants are now being constructed.

25899 **APTIC NO. 47364**

Inoguchi, Masao, Satoshi Sakurada, Yoshihito Satomi, Kiyohiko Inaba, Harumi Kagaya, Kazuhito Tate, Takehiko Mizutori, Reijiro Nishiyama, Tamotsu Nagai, and Saburo Onishi

STUDIES ON THE HYDRODESULFURIZATION CATALYSTS OF RESIDUAL FUELS (PART 7),-REGENERATION OF USED CATALYSTS. *Bull. Japan Petrol. Inst., 14(2):153-160, Nov. 1972. 3 refs.*

Catalysts which were used in the hydrodesulfurization of residual fuels for a long period of time were regenerated with air. The effects of regeneration on physical properties such as specific surface area, pore volume, mean pore diameter, and pore size distribution were investigated. Specific surface area of the catalysts decreased to 40% of the original value of the fresh catalysts. The specific surface area after regeneration recovered up to 50% in the upper part of the catalyst bed and about 70% in the lower part. After about 100 hr on stream, the specific surface areas of the catalysts were almost completely regenerated. Pore volume varied in proportion to the degree of recovery of the specific surface area, while the mean pore diameter became greater than that of the fresh catalyst by regeneration. Pore size distribution recovered more at the upper part of the catalyst bed than at the lower part after regeneration. When the decrease in catalytic activity was caused by deposited carbon, the major part of the activity was recovered after regeneration. This was not the case, however, with deposited metals such as vanadium. (Author summary modified)

25900 **APTIC NO. 47710**

Iwaki, T., S. Egarashi, and A. Okagami

A COMBINED METHOD FOR HYDRODESULFURIZATION AND STEAM REFORMING. *(Suiten datsuryu - suijoki kaishitsu ketsugo-ho). Text in Japanese. (Japan Volatile Oil Co.) Japan. Pat. Sho 47-4 522. 6p., Oct. 13, 1972. (Appl. Feb. 17, 1965, 1 claim).*

Hydrocarbon material containing sulfur compounds and hydrocarbons of higher than C3 with a final boiling point lower than 220 C is subjected to hydrodesulfurization using special catalyst of nickel and hydrogen gas mixed with carbon monoxide and carbon dioxide. The resulting hydrocarbon containing hydrogen sulfide is led to an absorbing tower where H2S is removed. The desulfurized hydrocarbon is introduced to a catalytic reforming bed which contains nickel, and steam is added. The purified gas contains hydrogen, CO, CO2, and methane. Part of the resulting gas is recycled to the desulfurization process serving as the H2 source without the removal of CO and CO2. One nickel atom in the solid catalyst combines and converts 0.5 to 0.8 atoms of sulfur.

25901 **APTIC NO. 47667**

Jenner, Josef

THE TEXTILE WIRE MESH TISSUE. *(Das textile Drahtgewebe). Text in German. Wasser Luft Betrieb, 16(11):386-388, 1972.*

Textile wire mesh tissues are of monofil thread which is woven of synthetic fiber. The meshes are mostly in a square form, but denser woven synthetic tissues are also available. Polyamide tissues have a chemical resistance ranging from neutral to alkaline (pH 7-14); they can resist long-term temperatures of about 100 C. Polyester tissues have a chemical resistance ranging from neutral to acid (pH 1-7) and a temperature resistance of 120 C. Polyvinyl chloride has a chemical resistance ranging from acid to alkaline (pH 1-14) and a temperature resistance of 70 C. The same is true for polyolefin tissues. The latter have a low mechanical strength, the former are sensitive to the effect of ammonia. Teflon tissues have a high chemical resistance (pH 1-14), a high temperature resistance of 200 to 220 C, and a low mechanical strength. The synthetic tissues are used for different purposes such as conveyor belts, presses and filters for air water. Tissues with square meshes are used for precise determination of the particle size. The smooth corrosion resistant surface of the fibers does not incrustate as easily and can be cleaned better.

25902 **APTIC NO. 47623**

Kobayashi, Shigehiko, Kazuhide Miyazaki, and Michiaki Yamamoto

CLEANING METHOD OF EXHAUST GAS CONTAINING CARBON MONOXIDE. *(Issankatanso o fukumu haigasu no jokahoho). Text in Japanese. (Mitsui Mining and Smelting Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-46253. 4p., Nov. 21, 1972. (Appl. Jan. 10, 1970, 1 claim).*

Using a mixture of manganese oxides and lead oxides, this method easily yet effectively removes carbon monoxide contained in automotive emissions by oxidizing CO to harmless carbon dioxide. A mixture of the manganese and lead oxides has the sustained ability to oxidate and purify the exhaust gas of a gasoline engine. The purification effect is highest when the mixing ratio of the two materials is 50:50 in terms of weight ratio. The effect decreases as the ratio deviates from 50:50. The purification agents are capable of oxidizing CO amounting to 100 times its chemical equivalent. For example, automotive emissions during idling contain CO of 5% concentration. This CO can be reduced instantaneously to only 2% by means of a small quantity of purfication agent. This is because the purification agent has a highly effective catalytic action. Despite the fact that a catalyst is generally extremely sensitive to humidity, this purification agent can be used under normal conditions without humidity adjustment.

25903 **APTIC NO. 47328**

Kubota, K., K. Kobayashi, N. Yoshikawa, H. Tosaki, and M. Tsuda

SOME PROPERTIES OF GRAY CAST IRON MELTED BY LPG FURNACE FOR PURPOSE OF FEW AIR POLLUTIONS. *(Teikogai taisaku o mokuteki to shita LPG-ro yokai chutetsu no ni, san no seishitsu). Text in Japanese. Imono (Foundry), 44(9):724-726, Sept. 1972. 2 refs.*

A newly designed liquefied petroleum gas burner was adopted to a furnace combining the shaft type and a reactor, and a pilot furnace was constructed for a capacity of 1.5 ton/hr. The properties of the gray cast iron product from this furnace were examined. The products were stable and satisfactory. From the economical standpoint, the furnace is very desirable. The amount of dust emission was much lower than an ordinary foundry, and a gas chromatography test proved that no treatment was necessary for the exhaust gas.

25904 **APTIC NO. 47598**

Kucera, H. L., J. R. Mewes, and P. H. Orr

CARBON MONOXIDE FROM ENGINES IN WAREHOUSE OPERATIONS. *Amer. Potato J., 49(3):93-97, 1972.*

Tests were conducted during the summer of 1970 to evaluate the production of carbon monoxide gas due to internal combustion engine operation in warehouses. Tests compared gasoline engines and propane gas engines, equipped with regular and catalytic mufflers, and with the fuel system at normal and 10% rich air-fuel ratios. The liquefied propane gas engine produced 50% less CO than the gasoline engine, and the catalytic muffler reduced CO by 40% when compared with a conventional muffler. Engines set at normal air-fuel ratios produced 42% less CO than engines set 10% rich. (Author abstract modified)

25905 **APTIC NO. 47650**

Kuroda, H., Y. Nakajima, Y. Hayashi, and K. Sugihara

ECONOMICAL MATCHING OF THE THERMAL REACTOR TO SMALL ENGINE-LOW EMISSION CONCEPT VEHICLES. *SAE (Soc. Automot. Engrs.) Spec. Pub., no. 370:1-15, May 1972. 10 refs. (Presented at the National Automotive Engineering Meeting, Detroit, Mich., May 22-26, 1972, Paper 720484.)*

As part of the Inter-Industry Emission Control program, many features of thermal reactors were tested. By introducing a new concept aimed at optimizing conditions for achieving hydrocarbon/ carbon monoxide oxidizing trigger temperature, improvement of the fuel economy of a low emission concept vehicle equipped with a thermal reactor was made possible. To realize these improvements, a new matching procedure of thermal reactor to engine was established. It was confirmed that by applying this new matching procedure, a considerable reduction in the field economy penalty could be realized without loss of emission performance. (Author conclusions modified)

25906 **APTIC NO. 47336**

Kurov, B. A.

PROBLEMS AND SOLUTIONS RELATED TO THE ABATEMENT OF AIR POLLUTION FROM AUTOMOBILES. *(Problema bor by s zagryazneniyem vozdukha avtomobilyami i puti eye resheniya). Text in Russian. Avtomot. Prom., no. 8:9-13, Aug. 1972. 3 refs.*

Problems and possibilities of the abatement of automobile-generated air pollution are reviewed. Automobile manufacturing plants should be equipped with adequate instrumentation for the measurement of exhaust emissions. Proper adjustment and good state of repair of operating automobiles are able to reduce emissions by 30-35%. Strict emission standards should be imposed. The carbon monoxide emission at idle is limited to 4.5% by volume, and another standard for nitrogen oxides is being prepared. Direct fuel injection results in reduced carbon emissions of 1/7 and in reduced hydrocarbon emissions of less than 1/4 the original values. Nitrogen oxide emissions can be reduced by decreasing the combustion temperature through the application of exhaust gas recycling, water addition, or timed ignition. Catalytic afterburning of the exhaust gases and positive crankcase ventilation are further possibilities to abate exhaust emissions, and so are the increased use of gas-powered vehicles and of engine designs different from gasoline engine.

25907 **APTIC NO. 47711**

Makigushi, Toshisada

THE PRESENT STATE AND THE FUTURE OF COUNTERMEASURES FOR PUBLIC NUISANCE AT FOUNDRY FACTORY. *(Imono kojo ni okeru kogai taisaku no genjo to shorai). Text in Japanese. Kinzoku Zairyo (Metals in Engineering), 12(9):85-98, Sept. 1972.*

Questionnaires were sent to foundries concerning various forms of public nuisance and answers were obtained from 74 factories. Sixty-five percent (48) answered that they were having problems presently; 81% (61) replied that they expected problems in the future; 54% (40) answered that previous problems have been treated, and 57% (42) answered that some countermeasures have been taken. The types of the present problems are noise, vibration, dust, and soot. Problems anticipated in the future are in the areas of toxic gases, bad odor, and the treatment of waste liquid. The types of factories with problems of dusts and soot are cupolas, electric furnaces, and sand treatment. The composition of dusts from cupolas is mostly approximately 30% silicon dioxide; the particle size distribution range from [illegible] to 200 micron. The dust quantity from electric furnaces used at foundry is 7.09 to 10.84 g/N cu m. The chemical composition of this type of dust is 27.26% SiO2, 0.6% alumina, 60.13% ferrous oxide, 26% calcium oxide, and 0.47% manganese oxide, with traceable heavy metals. Examples of dust collection systems presently used and their efficiencies include the wetcap type (72.9%), a wetcap and cyclone combination (71.9%), jet spray scrubber (87.5%), low pressure venturi scrubbers (90-92%), venturi scrubber and cyclone combination (94.5%), high pressure venturi scrubbers (90-94.5%), bag filters combining water and air coolers (99%), the double-water cooling bag filters (99.4%), and the dry electrostatic precipitators (97.5%).

25908 **APTIC NO. 47663**

Manske, Guenter

POSSIBILITIES OF REMOVING DUST FROM HOT GASES IN THE CEMENT INDUSTRY BY FABRIC DUST SEPARATORS. *(Moeglichkeiten der Entstaubung heisser Gase in der Zementindustrie duerch Gewebestaubabscheider). Text in German. Silikattech., 23(8):276-279, Aug. 1972. 8 refs.*

Large-scale experiments with glass-fiber bag filters used for the separation of dust from hot waste gases of rotary cement kilns are described. The host gas, carrying 50-60 g of finely dispersed dust/N cu m, was cooled from 320-380 C to 250-300 C before entering the filter equipment composed of six filter chambers with 12 bags each. Low residual dust content of 11-58 mg/N cu m at a space load of 0.3-0.4 cu m/sq m and at a hydraulic resistance of about 80 mm of water column was reached. Filter bags from pure glass-fiber have limited load capacity, though high efficiency.

25909 **APTIC NO. 47397**

Marder, M. I. and A. N. Khlebnikov

EXPERIENCE IN THE ABATEMENT OF PETROLEUM PRODUCT LOSSES ON STORAGE PREMISES AND AT GASOLINE STATIONS OF THE MAIN PETROLEUM PRODUCTS SUPPLY CENTER OF THE UKRAINIAN SSR. *(Opyt raboty po sokrashcheniyu poter nefteproduktov na neftebazakh i avtozapravochnykh stantsiyakh Glavneftesnabsbyta USSR). Text in Russian. Neft. Gazov. Prom., no. 4:45-47, 1972.*

Methods for the abatement of evaporative losses from crude and petroleum product storaging facilities such as applied at large storage areas and at gasoline stations are described. The application of a pressure of 200 mm water column inside the container and newly developed floating pontoons made of plastic materials are among the most effective control methods. It is possible to reduce the evaporative losses by means of floating pontoons by 70-90%. Such pontoons are presently used for tanks with a maximum capacity of 5000 cu m. The reduction in evaporative losses by the use of inexpensive reflecting disks is 20-40%.

25910 **APTIC NO. 47458**

Meins, Walter

REGENERATING ALKALI LIQUOR FOR WASHING HYDROGEN SULFIDE-AND MERCAPTAN-CONTAINING GASES AND VAPORS. *(Verfahren zum Regenerieren von Alkaliwaschlauge). Text in German. (Plafog Planungs- und Forschungsgesellschaft, Kulmbach (West Germany)) W. Ger. Pat. 1,494,810. 2p., Oct. 19, 1972. 1 ref. (Appl. Feb. 2, 1965, 3 claims).*

A process for the regeneration of soda lye used for washing hydrogen sulfide and mercaptan-containing gases and vapors is described. The bivalent sulfide and univalent mercapto (SH) ions are precipitated from the wash liquor by the addition of calcium hydroxide or oxide. The stoichiometric amount of sodium hydroxide thus liberated is recycled continuously, and the calcium sulfide sludge is removed for utilization as a pesticide or other products.

25911 **APTIC NO. 47640**

Morita, Minoru, Tatsuyuki Kasai, Yasuhiko Kamijo, and Misao Igarashi

ABSORPTION/REUSE METHOD OF SULFUR DIOXIDE USING SODIUM HYDROXIDE AND MAGNESIUM OXIDE. *(Suisankanatoryumu to sankamagunesyumu o mochiiru aryusangasu no kyushu to sairiyoho). Text in Japanese. (Tsukishima Kikai Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-46255. 5p., Nov. 21, 1972. (Appl. July 21, 1970, 1 claim).*

Sulfur dioxide containing some sulfur trioxide is neutralized to pH 6.5-7.2 by a sodium hydroxide solution. The sodium sulfite or sodium sulfate so produced by oxidation with the neutralization and air produces NaOH by magnesium hydroxide. The NaOH is then reused for absorption of SO2. On the other hand, the magnesium sulfite obtained through the above reaction process is washed with water so that the sodium hydroxide adhering to it may amount to 0.05-1.0% against dry magnesium oxide. It is they pyrolyzed into SO2 while solid magnesium oxide produced is reused for the caustification. Advantages of this method include: Since SO2 is neutralized by a complete solution of sodium hydroxide, any type of absorption can be selected for the process. For absorption of

SO2, NaOH is used that gives slower oxidation speed than magnesium hydroxide, so that less sodium hydroxide is reduced to sodium sulfate than magnesium hydroxide. In other words, a greater quantity of SO2 was generated per unit quantity of sodium hydroxide used. The sodium sulfate produced in a small quantity during the process may be utilized as a solution for pulp processing or can be readily marketed.

25912 **APTIC NO. 47648**

Morita, Tomijiro, Isao Funabashi, Masayoshi Sugai, and Tomomitsu Yamaguchi

DESULFURIZATION METHOD USING CYCLIC KETONE. *(Kanshiki keton o mochiiru datsuryuho). Text in Japanese. (Kureha Chemical Industry Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-46272. 3p., Nov. 21, 1972. (Appl. March 27, 1970, 1 claim).*

Sulfur dioxide contained in flue gas or other exhaust gas can be absorbed by a sodium sulfite water solution to produce an acidic sodium sulfite solution. By making this solution react with cyclic ketone possessing no substitution group in the carbon chemically contiguous to carbonyl group, the crystallized ketone-acidic sodium sulfite addition product is obtained. This addition product is decomposed into cyclic ketone, sodium sulfite, sulfur dioxide, and water by means of heat cracking. The cyclic ketone is then circulated for the reaction with the acidic sodium sulfite solution to produce the addition product while the sodium sulfite is recirculated for absorption of sulfur dioxide, thus providing the continuous cycle of the process to remove and recover sulfur dioxide from flue gas or other emission gas. In a practical case where this process was applied, a satisfactory result was obtained. Using 20.5 g of cyclohexanone as the cyclic ketone, a solution containing 21.7 g of acidic sodium sulfite, 37.6 g of sodium sulfite, 7.9 g of sodium sulfate, and 192.8 g of water was heated at 50 C for 1 hour while being stirred. The yield for the crystallized addition product obtained was 75.3% and the cyclohexanone acidic sodium sulfite contained in the addition product amounted to 81.3%. Then 39 g of the addition product obtained was heated at 150 C for 2 hours for the heat cracking process, thereby obtaining 4.8 g of sulfur dioxide and 15.0 of cyclohexanone.

25913 **APTIC NO. 47494**

Murakami, Keiichi, Hirobumi Tanaka, and Osamu Sato

MANUFACTURES OF CAS2O3 AND MG(OH)2 AS A USE OF SO2 FROM EXHAUST GASES AND OF S FROM HEAVY OILS. *(Datsuryu SO2, S no ichi riyoho to shite no chiryusan karushumu to subsanka maguneshumu no doji seizcho). Sekko Sekkai (Gypsum Lime), no. 117:48-53, 1972. 11 refs.*

Sulfur dioxide from exhaust gases and sulfur from heavy oils can be utilized to manufacture calcium thiosulfate, which is used to accelerate the hydration of Portland cement. Previous methods for making CaS2O3 are reviewed and new methods are examined. One advantageous method has been to utilize the reaction between calcium sulfite and sulfur. However, as the temperature increases, the reciprocal reaction predominates. The formation of magnesium thiosulfate from the reaction between magnesium sulfite and sulfur is accelerated with increasing reaction temperature. Since the positively charged divalent magnesium ion in MgS2O3 is easily replaced by the positively charged divalent calcium ion, a concentrated solution of CaS2O3 and magnesium hydroxide are produced simultaneously, by adding slaked lime-milk or slaked dolomite milk to the concentrated solution of MgS2O3. The CaS2O3 is also used in pulp processing and as an insecticide in lime-sulfur systems; Mg(OH)2 is an important raw material for refractories.

25914 **APTIC NO. 47611**

Muruta, Koei

PRESENT CONDITION OF DEVELOPMENT OF GASIFICATION AND DESULFURIZATION TECHNOLOGY. *(Gasuka datsuryu gijutsu kaihatsu no genjo). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), 1(1):36-39, 1972.*

A subsidy system has been set up for the development of closed process technology. Since 1972, three studies have been supported to promote the development of pollution-free production processes. Ube-type gasification and desulfurization is discussed. In the Ube process, heavy fuel oil or asphalt with a high sulfur content unsuitable for fuel is gasified with oxygen and steam to recover hydrogen sulfide from the stack gases. The amount of processed oil/unit volume of the reactor is larger than in other processes. Tar and cokes are completely collected. Sulfur is removed to 0.01% by an absorption method.

25915 **APTIC NO. 47649**

Nagata, Katsuya, Ken Okazawa, Chihiro Tsurumi, and Kaoru Tokunaga

STUDIES ON GENERATION OF NITROGEN OXIDES IN BOILER AND ITS CONTROL MEASURES; 3RD REPORT, RESTRAINT EFFECT AND CHARACTERISTIC OF EXHAUST GAS RECIRCULATION, TWO-STAGE COMBUSTION METHOD. *(Boira ni okeru chissosankabutsu no hassei to sono yokuseitaisaku ni kansuru kenkyu; Dai sanpo, haigasu junkan nidan nenshoho ni yoru yokuseikoka to sono tokusei). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 17-20, 1972. 2 refs. (Presented at the Japan Society of Mechanical Engineers, Hamamatsu, Japan, June 23, 1972. Paper 723-5.)*

A heavy oil combustion test device in which fresh combustion air was blown into the combustion chamber by a circulation blower was used to study nitrogen oxide generation. Part of the exhaust gas was mixed with fresh combustion air. In order to check the thermal efficiency and heat absorption ratio, the cooling calorific value was measured at the primary and secondary cooling pipes. A-type heavy oil was used as fuel. Two types of burners were used, one an airless spraying burner (12 l/hr in capacity) and the other an external mixing type air spraying burner (20 l/hr in capacity and 30 deg in swirler angle). Concentrations of NOx were measured by the naphthylethylene diamine method stipulated in JIS KO1O4. The type of combustion in which the oil-drop combustion range is long and temperature is locally high was avoided in order to ensure a gradual temperature rise in the earlier stage that promotes gasification of the fuel, thereby making the combustion a predominantly gasified fuel combustion. This was effective in suppressing generation of NOx. Increased flow velocity by exhaust gas recirculation, flame temperature drop by increased heat capacity, lower oxygen concentration, and stimulation of fuel gasification are all compatible with reduction of NOx.

25916 **APTIC NO. 47343**

Nakagawa, Shikazo

UTILIZATION OF LIME FOR DESULFURIZATION OF STACK GAS AND DEPOLLUTION OF INDUSTRIAL EFFLUENT. *(Sekkai katsuyo ni yoru haien datsuryu haisui joka). Text in Japanese. Sekko to Sekkai (Gypsum Lime), no. 115:260-267, Nov. 1972. 15 refs.*

An investigation of the supply and demand of gypsum in Japan for the past several years shows a serious shortage of supply, which was as much as 137,000 tons in 1971. This year the shortage was 50,000 tons but the projected figures for the next five years also show up to 80,000 tons/year shortage. The use of lime for desulfurization of stack gases and quick production of gypsum is an answer to that shortage. The characteristic of this method is a quick oxidation of slurry lime containing sulfur dioxide by a special rotary atomizer, and production of a fine quality gypsum in an oxidation tower. Stack gas is cooled to 50 60 C, and after eliminating dust, sent to an absorption tower, where sulfur dioxide is absorbed by lime slurry. The slurry is then atomized under a 5 kg/sq cm/G pressure and a 60 80 C temperature; air bubbles oxidize the slurry. The thick gypsum slurry is then sent to a centrifugal separator where water is eliminated to less than 10%.

25917 **APTIC NO. 47605**

Nakai, Yoshiyuki and Tetsuya Yokokawa

ECONOMICALITY AND PRACTICAL EFFECT OF SHINKOSHI TYPE SMOKE CONTROL AND DESULFURIZATION EQUIPMENT. *(Shinkoshi-shiki haien datsuryu sochi no keizaisei to jitsuyo koka). Text in Japanese. PPM (Japan), 3(12);18-24, Dec. 1972.*

The Shinkoshi Smoke control and desulfurization system has a continuous liquid film in constant contact with the gas. Both liquid circulation and liquid-gas ratio are minimum. Byproducts, at whatever concentration, can be taken out selectively; it is possible to obtain high concentration byproducts. Fluctuation in liquid-gas ratio and gas flow velocity can be coped with easily, and there is very little overflow or channeling. Pressure loss is minimal, and it is not affected by the liquid-gas ratio. Because of the cross flow contact between liquid and gas, there is greater economy. There is no clogging of dust. It is possible to design the system in such a way that mass flow ratio of gas and liquid are complete. Distribution of the absorbing liquid can be completely balanced, contrary to former gas absorption equipment. There is no need to use filter material, so that the equipment can be compact, light, and cheap to construct. After experimenting on a 3000 N cu m/hr pilot plant, using stack gas from a sintering furnace of Nippon Steel Pipe Co. s Keihin Steel Mill, a maximum desulfurization ratio of 98.9% was obtained. The system is being utilized at a steel mill and pulp plant boiler with good results.

25918 **APTIC NO. 47416**

Nishikawa, Takishi

MANUFACTURING METHODS FOR POROUS SUBSTANCES. *(Tako shitsu tai no seizo ho ho). Text in Japanese. (Sumitomo Electric Industry, Ltd. (Japan)) Japan. Pat. Sho 47-45254. 3p., Nov. 15, 1972. (Appl. June 20, 1967, 1 claim).*

A manufacturing method for a porous aluminum filter uses anodic oxidation. Aluminum is fixed to a material and shaped. Extra strength is given to the alumina so that it can be under high pressure. The porous aluminum filter can be used to separate gases.

25919 **APTIC NO. 47705**

Oda, Takeshi

AN AMMONIA RECOVERY DEVICE FOR THE EMISSION GAS PRODUCED BY PLASTIC WASTE TREATMENT. *(Purasuchikku haikibutsu shori ni okeru hassei gasu yori no ammonia kagobtsu kaishu sochi). Text in Japanese. (Takuma Boiler Mfg. Co. (Japan)) Japan. Pat. Sho 47-38759. 3p., Sept. 30, 1972. (Appl. Feb. 14, 1970, 1 claim).*

A method of recovering hydrogen chloride produced by dry distillation of plastic waste is discussed. According to the quantity of HCl or any other type of acidic gas produced by plastic waste, a certain amount of ammonia gas is supplied and ammonium chloride (to be used as fertilizer) is recovered. The distillate can be used as a fuel. This will prevent the corrosion of incinerators and prevent air pollution. Plastic waste is crushed in a crusher and fed into a dry distillator through a feeder. Waste is distilled without an air supply at 250 to 300 C. The HCl is completely emitted, and the residue is sent to an ordinary incinerator by a conveyor. The combustion gas from the incinerator is cleaned by a dust eliminator and clean air is emitted from the stack. The combustion heat of the incinerator can be used for dry distillation. The HCl is led to a reactor where ammonia gas is supplied through a control valve of the ammonia gas tank, which is automatically controlled according to the amount of gas. The white ammonia compound particles are separated by precipitation in a cyclone.

25920 **APTIC NO. 47419**

Olmsted, Leonard M.

NEW UNITS PROTECT THE ENVIRONMENT. *Elec. World, 178(9):39-62, Nov. 1, 1972.*

Environmental protection is a major requirement in specifications for the design, construction, and ultimate operation of fossil fueled steam power plants. Statistics were collected on generating unit designs projected for operation after 1974; trends in specifications with respect to environmental protection are analyzed. The most striking trend is the sharp rise in the use of evaporative cooling towers. Other predominant pattern changes include the drive for low-sulfur fuel; the use of electrostatic precipitators, mechanical separators, and higher stacks; improved station architecture; noise level controls; larger feed pumps; lower steam pressures; and steadier steam temperatures. Survey results are tabulated for 93 new generating plants.

25921 **APTIC NO. 47695**

Ruegg, Hansjakob

AIR FILTERS FOR CLEAN ROOMS. *(Luftfilter fuer Reinraeume). Text in German. Schweiz. Bl. Heizung Lueftung, 39(3):80-82, 1972. (Presented at the SRRT Conference, 1972.)*

High-efficiency air filters for clean rooms, and test methods for such filters are described. Air filters for clean rooms are classified as coarse, fine dust, and aerosol filters in Switzerland. Aerosol filters are composed of folded layers of glass fiber tissue. The glass fibers are of varying diameters with a minimum of 0.1 micron. The folded filter layers are separated by corrugated plates, cardboard, paper strips, or filaments. Such aerosol filters, with a minimum efficiency of 99.97%, are tested by means of atmospheric air to which paraffin oil aerosol with a particle size frequency maximum at 0.3-0.5 micron is added. The filter efficiency is determined from the particle concentration obtained by means of scattering photometer. Aerosol filters are tested for tightness by means of an oil aerosol with 100 mg/cu m concentration against dark background.

25922 **APTIC NO. 47415**

Sakabe, Atsushi

ENVIRONMENTAL PROTECTION AND SAFETY. *(Kogai, anzen). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan, Tokyo), 51(546): 991-993. Oct. 1972.*

The Reinluft desulfurization method has been studied since 1966. A 55 MW pilot plant was erected and then enlarged to a 150 MW power plant. In the Reinluft method, sulfur dioxide is absorbed in a scrubber. Adsorption of SO2 by activated coal has been tested with a 62 MW plant. Manganese oxide can also be used to absorb SO2. Control methods used at larger electric power plants are discussed. Several methods result in the formation of sulfuric acid which can be sold or reused. The Chemico lime method is used in an aluminum plant to control 380,000 N cu m/hr of smoke and to eliminate dust.

25923 **APTIC NO. 47302**

Siebenmann

GAS TREATMENT. *(Le traitement des gaz). Text in French. Colloq. Int. Homme, Air Eau, Paris, France 1972, 6p. (June.)*

Equipment for the treatment of dusty industrial waste gases is described. The equipment uses water as a solvent for gaseous components and as captor and carrier for solid particles. It represents a rectangular tank subdivided into a number of chambers the first of which receives water spray for catching the coarsest particles. The waste gas then passes through a series of conical chambers with wetted walls. The last conical chamber is closed by a wetted filter serving both as a last stage for the waste gas and as a preliminary stage for the treatment of the water used. The filtration in this stage may be also combined with chemical or adsorption effects. The cleaned waste gases leaving the last stage are sent through a set of baffles on their way to the stack. The water can be used in closed cycle.

25924 **APTIC NO. 47368**

Spaite, Paul W.

SO2 CONTROL: STATUS, COST AND OUTLOOK. *Power Eng., no. 10:34-37, Oct. 1972.*

The state-of-the-art of various sulfur dioxide control processes is reviewed, with respect to the stage of development economic and technological feasibility, and commercial potential, with particular application to power plant stack gases. These methods include non-regenerable limestone or lime slurry processes; sodium solution scrubbing; sodium scrubbing with electrolytic regeneration; magnesium oxide slurry scrubbing with recovery of sulfur or sulfuric acid; sorption of SO2 on active char; and catalytic oxidation. Advantages, disadvantages, and design data are reviewed.

25925 **APTIC NO. 47412**

Stahl, Guenter

DESIGN AND OPERATION OF A NEW LAYER CHARGING METHOD FOR RECIPROCATING PISTON ENGINES. *(Gestaltung und Arbetsweise eines neuen Schichtladeverfahrens fuer Hubkolbenmotoren). Text in German. Motortech. Z. (Stuttgart), 74(12):469-474, Dec. 1972. 5 refs.*

A new combustion process for reciprocating piston engines is described through which a layering of fuel and air is achieved by division of the combustion chamber into entrance and exit section. The fuel is injected into the intake pipe during the second half of the intake stroke. The entrance and exit sections are connected by a narrowed cross section which still needs further development. The spark plug is arranged in the entrance section. The first tests were carried out with a single-cylinder four-stroke engine modified according to the new combustion method. Even with high air surplus (lambda more than two) the ignition was satisfactory. The load regulation of the engine was achieved solely by regulating the fuel quantity. For starting and low partial load the additional throttling of the intake air was advantageous. The first indications of achieving a faborable exhaust gas emission without additional engine modifications were obtained. Further experimental and developmental work will have to concentrate on finding the best conditions for carrying out the process and the best shape of the combustion chamber.

25926 **APTIC NO. 47347**

Step, N. Ya., O. N. Dyment, and B. B. Chesnokov

CATALYTIC DECONTAMINATION AND USE OF EXHAUST GASES FROM THE PRODUCTION OF ETHYLENE OXIDE. *(Kataliticheskoye obezvrezhivaniye i ispol zovaniye abgazov proizvodstva okisi etilena). Text in Russian. Khim. Prom. (Moscow), no. 9:654-656, 1972. 6 refs.*

The possibility of the catalytic treatment by means of ShPK-2 type multilayer platinum catalyst of ethylene-containing waste gases from the production of ethylene oxide, and the utilization of the hot, high-pressure waste gases after treatment, were studied in experiments. The rate of ethylene oxidation was highest with 98.3% at a flow rate of 0.31 m/sec, an initial gas temperature of 190-210 C, and a space velocity coefficient of 36,000/hr. High rates of catalytic conversion on the first, second, and third catalyst layers were observed, while the fourth and fifth layers were practically inactive. The catalyst activity decreased gradually with time. The utilization of the treated gases with a temperature of 650 C and under high pressure for turbines and for steam generation may result in a decrease of 10% of the ethylene oxide production costs.

25927 **APTIC NO. 47626**

Takahashi, Shigenori and Sadaichi Akizuki

DISPOSAL DEVICE FOR BOILER FLUE GAS. *(Boira haigasu shori sochi). Text in Japanese. (Kawasaki Heavy Industries Co. Ltd., Kobe (Japan) and Nippon Sanki Co., Tokyo (Japan)) Japan. Pat. Sho 47-45672. 3p., Nov. 17, 1972. (Appl. May 10, 1969, 1 claim).*

Blow water from the steam-water drum of the boiler is utilized for scrubbing boiler flue gas. A heavy oil-fueled boiler often generates soot, depending on the combustion conditions. The soots contain a considerable amount of sulfur dioxides and trioxides, which should be removed from the flue gas before it is discharged into the atmosphere. In this new method designed to remove such soots from the boiler flue gas, the blow port of the steam-water drum is connected to a wet-type dust collector by a blow water pipeline. The dust collector is directly connected to the flue of the boiler and equipped with a scrubbing water tank from which the scrubbing water is circulated through the dust collector by means of a pump. A supplemental water supply tank is also connected to the blow water pipeline. Alkalinity of the supplemental water is adjusted by adding chemicals, according to the quantity of the flue gas discharged. Alkalinity of the circulating scrubbing water of the dust collector is adjusted likewise. The blow water together with the supplemental water plus the circulating scrubbng water is thus utilized altogether to scrub the flue gas for effective dust removal and neutralization of the usually acidic flue gas.

25928 **APTIC NO. 47622**

Tashiro, Minoru and Kinji Tsujimura

CONTROL MEASURES FOR DIESEL ENGINE EMISSION. *(Diizeru kikan no haikitaisaku). Text in Japanese. Nainen Kikan (Internal Combust. Engine), 11(131):119-127, Nov. 1972. 13 refs.*

Causes of nitrogen oxides, carbon monoxide, and hydrocarbons from a diesel engine are discussed. The HC and CO emissions can be reduced by promoting perfect combustion of fuel which is compatible with improved power output and fuel consumption efficiency. The problem is that control measures for NOx emissions result in lower power output, poor fuel economy, and increased HC, CO, and smoke emissions. The NOx emissions can be reduced generally by reducing combustion temperature, oxygen concentration, and the reaction time. Exhaust gas recirculation, water injection, water-light oil emulsion fuel, and modifications of the intake system, injection system, and combustion chamber are possible control methods. The smoke, developed power, and emission concentration change when the intake conditions such as humidity, temperature, and pressure are changed. The air/fuel ratio and resolution speed also affect the NOx emission. Effects on the NOx emission of other factors including the compression ratio, shape of the combustion chamber, overcharging, and fuel composition are all discussed.

25929 **APTIC NO. 47485**

Thompson, A. L.

BUICK S 1972 EXHAUST GAS RECIRCULATION SYSTEM. *Preprint, Society of Automotive Engineers, Inc., New York, 5p., 1972. (Presented at the Society of Automotive Engineers, National Automobile 720519.)*

Programmed-metered exhaust gas dilution of the engine intake charge was adopted as the major means of reducing nitrogen oxide emission levels in some 1972 models. The major considerations of the modification, designdetails for the system, and field experiences are reviewed. Limits of the usefulness of the exhaust gas recirculation system and needed improvements are also examined. (Author abstract modified)

25930 **APTIC NO. 47500**

Vatavuk, William M.

A MATHEMATICAL TECHNIQUE FOR CALCULATING OVERALL EFFICIENCIES OF PARTICULATE AIR POLLUTANT CONTROL DEVICES. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., 23p., 1972. 7 refs.*

A generalized mathematical technique was developed to calculate the overall collection efficiency of particulate control devices, utilizing equipment operating parameters and the size distribution of the particles in the inlet gas stream. The technique was successively applied to efficiency calculations for settling chambers, cyclones, venturi scrubbers, and electrostatic precipitators. Extension of this mathematical method was made to encompass control devices operated in series. Specific numerical examples are included to illustrate the technique, when applied to single and multiple devices. (Author abstract)

25931 **APTIC NO. 47625**

Vosolsobe, Jan, Vladimir Glaser, Josef Bohac, and Lubomir Saleta

INFLUENCE OF THE COMPONENT PROPORTIONS ON THE ACTIVITY OF LOW- TEMPERATURE WATER VAPOR CARBON MONOXIDE CONVERSION CATALYSTS. *(Vliv pomeru slozek na aktivitu nizkoteplotnich katalyzatoru pro konverzi kyslicniku uhelnateho vodni parou). Text in Czech. Chem. Prumysl (Prague), 22(9):434-436, 1972. 32 refs.*

The study was designed to determine the optimal copper oxide/zinc oxide/chromium oxide ratio in the catalyst used for the thermal conversion of carbon monoxide to carbon dioxide by steam. Varying composition catalysts were prepared by precipitation of a mixture of nitrates by a solution of ammonium hydroxide and carbonate. The gas mix used contained 26-30 vol% CO, 1-2.5% CO_2, 4-6% nitrogen, and 61.5-69% hydrogen. The tests were performed in a steel reactor filled with the catalyst over which the gas-steam mixture was passed at 220, 240, 260, and 280 C. The resulting CO, O_2, CO_2 content was analyzed by the Orsat instrument. Test results disclosed that a catalyst containing 30% CuO, 68.5% ZnO, and 1.5% Cr_2O_3 converted 94.6% CO at 220 C, 95.4% CO at 240 C, 95.7% CO at 260 C, and 96.3% CO at 280 C to CO_2. The model catalyst was compared with imported commercial catalyst and found to be comparably effective.

25932 **APTIC NO. 47319**

Yamazaki, Kanzo

GRANULATING, AGGLOMERATING AND MOLDING METHOD FOR ACTIVATED CARBON. *(Kasseitan zoryu, zokai, narabini seikei hoho). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-36631. 3p., Sept. 14, 1972. (Appl. Aug. 5, 1968, 1 claim).*

Cement is mixed with pulverized or granulated activated carbon in the amount of 5 to 100% of the weight of the cement. Water in the amount of 40 to 400% of the weight of the cement is added, and the mixture is stirred well. The mixture is then hardened, dried, and crushed into particles or lumps. The mixture may be poured into molds, hardened, dried, and used in a brick or other forms. The hardened material is a porous concrete product with 0.15 to 2.0 specific weight. It can filter liquid or gas at a given speed. It has the same deodorizing effect and adsorption capacity as the more expensive powdered activated carbon. As a test, 50 g of the granulated test material (5 to 10 mesh) was put in a cotton bag and placed in a polyvinyl bucket type garbage container. When the container was opened 24 hours later, almost no odor was detected.

1971

25933 **APTIC NO. 47791**

(Inventor not given.)

EQUIPMENT FOR THE CAPTURE OF FOG, SMOKE AND SIMILAR AEROSOLS. *(Dispositif de captation de brouillard, fumees et analogues). Text in French. (Bodin-Girin et Cie - Tissus Industriels (France)) French Pat. 2,088,779. 18p., Dec. 13, 1971. (Appl. April 24, 1970, 15 claims).*

A tissue filter composed of several layers of warp and weft for the capture of fumes, smoke, vapors, particles, and droplets is described. The tissue reinforced by bars and tubes is stabilized by heat treatment. The tissues are arranged to form roof-like or pyramidal structures.

25934 **APTIC NO. 47581**

Archer, D. H., D. L. Keairns, J. R. Hamm, R. A. Newby, W. C. Yang, L. M. Handman, and L. Elikan

EVALUATION OF THE FLUIDIZED BED COMBUSTION PROCESS. VOLUME III. APPENDEX C. DEVELOPMENT OF FLUIDIZED BED COMBUSTION BOILERS. *Westinghouse Research Labs., Pittsburgh, Pa., Office of Air Programs Contract CPA 70-9, APTD-1167, 38p., Nov. 1971. 54 refs.*

NTIS: PB 213152

Fourteen boiler systems which incorporate fluidized bed combustion for control of sulfur oxide emissions are examined. The basic principles of operation and design criteria are reviewed for each. Unit capacity, operating conditions, additive type, and technical feasibility are examined.

25935 **APTIC NO. 47582**

Archer, D. H., D. L. Keairns, J. R. Hamm, R. A. Newby, W. C. Yang, L. M. Handman, and L. Elikan

EVALUATION OF THE FLUIDIZED BED COMBUSTION PROCESS. VOLUME III. APPENDIX E. TURNDOWN TECHNIQUES FOR ATMOSPHERIC FLUIDIZED BED BOILERS. *Westinghouse Research Labs., Pittsburgh, Pa., Office of Air Programs Contract CPA 70-9, APTD-1167, 17p., Nov. 1971.*

NTIS: PB 213152

Applicable turn-down techniques for an atmospheric fluidized bed boiler were analyzed. The effectiveness of different techniques for altering the bed temperature, the heat transfer coefficient, and the heat transfer surface in the bed is examined. Bed operating conditions, e.g., bed temperature, excess air, and coal feed rate, before and after turn-down were also studied. The most economical and convenient turn-down technique was changing air and coal feed simultaneously and maintaining the excess air constant. To increase the turn-down ratio, the fluid bed can be shut down by sections. (Author abstract modified)

25936 **APTIC NO. 47583**

Archer, D. H., D. L. Keairns, J. R. Hamm, R. A. Newby, W. C. Yang, L. M. Handman, and L. Elikan

EVALUATION OF THE FLUIDIZED BED COMBUSTION PROCESS. VOLUME III. APPENDIX F. DYNAMICS OF ATMOSPHERIC FLUIDIZED BED BOILER. *Westinghouse Research Labs., Pittsburgh, Pa., Office of Air Programs Contract CPA 70-9, APTD-1167, 27p., Nov. 1971. 5 refs.*

NTIS: PB 213152

The dynamic behavior of atmospheric fluidized bed boilers was analyzed mathematically to give some insight into the design and operational problems. Response time for ignition from a neighboring bed was quantitatively estimated using the atmospheric industrial fluidized bed boiler design as an illustration. Burners for start-up and restart during load swing were also sized, based on a load response rate of 10%/min. To achieve this response rate, the total thermal capacity of the burners is close to 50% of total boiler capacity. Methods for start-up and restart are also reviewed. Rate of bed temperature change and residual steam generation in a fluidized bed after shut-down were mathematically analyzed. Turning off the bed by stopping the coal and air feed simultaneously; stopping only the coal feed and keeping the bed fluidized; and stopping the coal feed and maintaining the fluidization with solid recirculation from the neighboring operating bed were examined. (Author abstract modified)

25937 **APTIC NO. 47584**

Archer, D. H., D. L. Keairns, J. R. Hamm, R. A. Newby, W. C. Yang, L. M. Handman, and L. Elikan

EVALUATION OF THE FLUIDIZED BED COMBUSTION PROCESS. VOLUME III. APPENDIX G. OPTIMIZATION OF HEAT TRAP SYSTEM COST. *Westinghouse Research Labs., Pittsburgh, Pa., Office of Air Programs Contract CPA 70-9, APTD-1167, 12p., Nov. 1971.*

NTIS: PB 213152

One graphic and one analytical method were developed for determining the optimum air preheat temperature and for optimizing the cost of the heat trap system, including economizer and air preheater. The calculation is sensitive to the relative unit cost of economizer and preheater. For a 300 megawatt atmospheric fluidized bed boiler design with specified operating conditions, the optimum air preheat temperature, which minimizes the total cost of the heat trap system, was determined at 560 F. (Author abstract modified)

25938 **APTIC NO. 47585**

Archer, D. H., D. L. Keairns, J. R. Hamm, R. A. Newby, W. C. Yang, L. M. Handman, and L. Elikan

EVALUATION OF THE FLUIDIZED BED COMBUSITON PROCESS. VOLUME III. APPENDIX I. SORBENT REGENERATION/SURFUR RECOVERY SYSTEMS DESIGN AND COST. *Westinghouse Research Labs., Pittsburgh, Pa., Office of Air Programs Contract CPA 70-9, APTD-1167, 39p., Nov. 1971.*

NTIS: PB 213152

Flow diagrams, material balances, equipment design, and cost estimates for the regeneration and sulfur recovery plants within the context of fluidized bed combustion are examined. The regenerator process coupled to the pressurized boiler employs the two-step conversion of calcium sulfate to calcium sulfite while producing hydrogen sulfide for sulfur recovery in a Claus plant. The regenerator process coupled to the atmospheric boiler uses one- step conversion of calcium sulfate to calcium oxide while driving off the sulfur dioxide for subsequent sulfur recovery as sulfur or sulfuric acid. (Author abstract modified)

25939 **APTIC NO. 47586**

Archer, D. H., D. L. Keairns, J. R. Hamm, R. A. Newby, W. C. Yang, L. M. Handman, and L. Elikan

EVALUATION OF THE FLUIDIZED BED COMBUSTION PROCESS. VOLUME III. APPENDIX L. BOILER BURNER FOR LOW BTU GAS. *Westinghouse Research Labs., Pittsburgh, Pa., Office of Air Programs Contract CPA 70-9, APTD-1167, 8p., Nov. 1971.*

NTIS: PB 213152

Burner design and engineering firms were contacted to prepare a preliminary design and cost estimate and to assess the development requirements for a boiler burner for desulfurized low-Btu gas from the atmospheric pressure fluidized bed oil gasification system. A burner for this gas is technically feasible, and burners could be designed for a demonstration plant. Rough cost projections were estimated. (Author abstract modified)

25940 **APTIC NO. 47588**

Archer, D. H., D. L. Keairns, J. R. Hamm, R. A. Newby, W. C. Yang, L. M. Handman, And L. Elikan

EVALUATION OF THE FLUIDIZED BED COMBUSTION PROCESS. VOLUME III. APPENDIX N. STACK GAS COOLER DESIGN. *Westinghouse Research Labs., Pittsburgh, Pa., Office of Air Programs Contract CPA 70-9, APTD- 1167, 17p., Nov. 1971.*

NTIS: PB 213152

Design specifications and costs for the stack gas coolers that recover heat from the exhaust gas from the gas turbine within a pressurized fluid bed power system are summarized. Boiler feedwater is heated to 578 F in the heat recovery system. Two quotations are cited for the stack gas coolers. The design of one was modular, and the cost for both a 318 and 635 megawatt plant was $4.1/kw including transition ducting with the gas turbines. The other estimate was $3.7/kw for the 635 megawatt plant and did not include ducts and connection with the gas turbines. (Author abstract modified)

25941 **APTIC NO. 47690**

Arnold, Orlan M.

EQUIPMENT GUARANTEES, PERFORMANCE TESTING, AND STARTUP PROCEDURES. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 25, p. 25-1 to 25-38.*

With an awareness of the pitfalls which result from a lack of understanding, omissions in contracts, failures to obtain and use actual and reliable test data, and carelessness in defining required performances in purchase of equipment, an attempt is made to bridge these gaps by alerting those concerned in the air and water pollution control programs of these shortcomings. Guidelines are presented for establishing contract responsibilities and agreements. Influences and effects of the accelerated air pollution control programs have marked effects on the requirements, methods, guarantees, and procedures in air pollution control. Uncertainties in limits of specific air pollutant outlet loadings with changing code regulations are cited, and reasons why certain industries resist investing in new air pollution control equipment are given. The phases involved in establishing equipment guarantees are listed, as well as the primary steps in evaluation, setting requirements, prescribing guaranteed performance specifications, and installing dust and fume collection systems. Factors to be considered for an evaluation of air pollution control equipment are included, as well as the requirements for accurate, reliable sampling, and test data. Startup procedures and costs are also discussed.

25942 **APTIC NO. 47676**

Barzler, R. P., D. J. Giffels, and Edward Willoughby

POLLUTION CONTROL IN FOUNDRY OPERATIONS. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 11, p. 11-1 to 11-20.*

It is possible to build, ventilate, and operate foundries, both new and old, so that they can be regarded as clean in the practical sense of the word. Process exhaust ventilation, adequate makeup air, and good housekeeping are indicated for control of in-plant pollution. In foundry applications, the air pollutants for the most part are particulate in nature-- that is, heavy and light dusts, smokes, and fumes. For this reason, dust collectors make up the bulk of the air cleaning equipment. Mechanical separators, wet scrubbers, and fabric arrestors are used extensively for foundry systems. Dust collector size, working principles, collected solids handling, application limitations, and costs are considered. Characteristics and sources of contaminants, airstream conditions, space available, and applicable codes are mentioned. Control is discussed for cupolas, electric arc and induction furnaces, pouring and molding operations, grinding, abrasive blasting, and other operations.

25943 **APTIC NO. 47675**

Baskin, B., D. J. Giffels, and E. Willoughby

POLLUTION CONTROL IN METAL FABRICATING PLANTS. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 13, p. 13-1 to 13-22.*

Threshold limit values, ventilation and pollution control, machining, surface finishing, heat treating, joining processes, finishing operations, surface coating, paint baking and stripping, air pollution control equipment costs, waste water treatment, and plant layout are discussed for the metal fabricating industry. Fundamental to any plant layout and planning considerations is the attutude of management, which must be predicted on the concept that the resolution of the plant pollution problem is an inescapable concomitant of the plant operation. The significance and the priority assigned to problems of atmospheric and industrial pollution control must be elevated to the status of the more directly related production factors such as good housekeeping, enforcement of proper safety practices, efficient material flow, production processes, and machine operations.

25944 **APTIC NO. 47684**

Billings, R. M. and G. G. DeHaas

POLLUTION CONTROL IN THE PULP AND PAPER INDUSTRY. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 18, p. 18-1, 18-2, 18-17 to 18-28. 12 refs.*

Most air pollution problems, specific for the pulp and paper industry, are associated with the production of kraft pulp and to a lesser degree, with sulfite pulp. The nature of the pulping processes, effects of pollution, and abatement objectives are considered, as well as analytical and monitoring methods. Sulfur compounds, present in pulp mill emissions, can be detected by the human nose at concentration levels of less than 5 ppb. Sulfur dioxide in sufficiently high concentrations can cause corrosion, damage to metals, and leaf damage to vegetation. The plumes and particulates from both kraft and sulfite mills can result in corrosion and a loss of visibility. Odor threshold values are presented for some of the orgainc sulfur compounds. Recovery and control in kraft mills are discussed, including digester relief and blow gases, evaporator noncondensables, recovery furnace flue gas, flue gas in direct contact evaporators, black liquor oxidation, electrostatic precipitators, venturi scrubbers, stack gas dilution, and odorous liquid effluents. Sources, pollutants, and the abatement procedures are listed for kraft mills. Containment in sulfite pulp mills is also mentioned.

25945 **APTIC NO. 47591**

Bryers, R. W., J. D. Shenker, and R. J. Zoschak

EVALUATION OF THE FLUIDIZED BED COMBUSTION PROCESS. VOLUME III. APPENDIX H. PRESSURIZED BOILER DESIGN REPORT. *Westinghouse Research Labs., Pittsburgh, Pa., Office of Air Programs Contract CPA- 70-9, APTD-1167, 210p., Nov. 1971.*

NTIS: PB 213152

A conceptual design was developed for a pressurized fluidized bed steam generator to be used in a 318 megawatt combined cycle utility power plant. Design, cost, coal handling and feeding equipment, and particulate removal equipment are examined. Cost estimates were extrapolated to a 636 megawatt capacity. (Author abstract modified)

25946 **APTIC NO. 47593**

Bryers, R. W. and J. D. Shenker

EVALUATION OF THE FLUIDIZED BED COMBUSTION PROCESS. VOLUME III. APPENDIX K. ATMOSPHERIC-PRESSURE BOILER DESIGN REPORT. *Westinghouse Research Labs., Pittsburgh, Pa., Office of Air Programs Contract CPA 70-9, APTD-1167, 188p., Nov. 1971.*

NTIS: PB 213152

A conceptual design of a 280 megawatt atmospheric pressure fluidized bed boiler was developed on the basis of investigations of fuel, sorbent, and system specifications; boiler design concepts; operating procedures and variables; boiler costs; development requirements; and accessory equipment design. The preferred arrangement, a once-through sub-critical pressure steam generator, consists of four modules each containing six vertically stacked beds including a carbon burnup cell. The cost estimates were extrapolated to 300 MW and 600 MW levels and compared with conventional boilers of similar size. An atmospheric pressure fluidized bed boiler would generate steam and provide adequate control of particulates at a capital cost of boiler plant equipment 10% lower than a conventional coal-fired plant. (Author abstract modified)

25947 **APTIC NO. 47689**

Calaceto, Ralph R.

AIR POLLUTION CONTROL EQUIPMENT. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw- Hill, 1971, Chapt. 23, p. 23-1 to 23-39.*

The first consideration in the proper selection of a collector is the nature of the pollutant materials to be collected. Particle size, gas temperature, and corrosive constituents are all factors influencing equipment selection and design. To acquire this knowledge, samples of dust and mist must first be collected. Sulfuric acid mist is considered to illustrate how the chemical properties of a pollutant can cause complications. Photoelectron microscopy and cascade impactor analysis may be used to determine particle size, while the thimble method or a Smith-Greenberg impinger can be used for analyzing dust, fumes, and particulate matter. The determination of gaseous contaminants, gas volume, gas density, and mists and dusts is indicated. Purposes of control equipment and factors affecting equipment selection are listed. Equipment design, advantages, limitations and operating factors of filters (cloth and bag), cyclones, gravitational collectors, impingement separators (baffles) electrostatic precipitators, and wet scrubbers (venturi, spray, packed, and cyclonic) are outlined. Methods for the minimization of steam plumes, which are the result of rapid cooling of gases or air carrying moisture to below the saturation temperature, are also presented. Air pollution control regulations and control criteria are also indicated.

25948 **APTIC NO. 47592**

Casapis, M., E. Berman, W. Craig, and J. Crowley

EVALUATION OF THE FLUIDIZED BED COMBUSTION PROCESS. VOLUME III. APPENDIX J. PRESSURIZED BOILER COMBINED CYCLE PLANT REPORT. *Westinghouse Research Labs., Pittsburgh, Pa., Office of Air Programs Contract CPA 70-9, APTD-1167, 112p., Nov. 1971.*

NTIS: PB 213152

The operating procedures, system design, equipment, construction schedule, and cost summary for a 635 megawatt fluidized bed boiler combined cycle plant are examined. The unit consists of the turbine generator and auxiliaries, heat rejection systems, condensing systems, feedwater heating systems, steam generator and auxiliaries, closed water cooling system, water treatment system, fire protection system, and miscellaneous equipment including a carbon dioxide scrubber, Claus plant, and dolomite regenerator system. Total costs for complete plant construction are estimated at $171,500,000.

25949 **APTIC NO. 47465**

Collomb, Felix and Christian Fourre

HYDROCARBON-DESULFURIZING COMPOSITIONS. *(Entschwefelung von Kohlenwasserstoffen). Text in Ger-*

man. (Aquitainechimie, Usine de Pardies (France)) W. Ger. Pat. Appl. 2,144,567. 12p., Sept. 6, 1971. (12 claims).

Hydrocarbon desulfurizing catalysts may be manufactured by impregnating an aluminum oxide carrier with an aqueous ammonium solution of a copper salt under pressure to give a copper oxide coating of 3-15 wt% based on Cu. The aluminum oxide carrier preferably has a specific surface area of 30-6000 sq m/g and a pore vol of 15-60 ml/100 g.

25950 **APTIC NO. 47682**

Gilde, L. C.

POLLUTION CONTROL IN FOOD INDUSTRIES. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 16, p. 16-1 to 16-46. 7 refs.*

The food industry needs a water supply that can be utilized for processing purposes with satisfactory quality that can be reasonably treated, and at the same time, the industry has an obligation to be sure that the effluents from its operations are creating no problems for downstream users. Because the industry is involved with the total environment from the farm to the consumer, it recognizes the tremendous complexity of the complete problem. Supply requirements, use, reuse, and segregation are discussed for water. Sources and characteristics of food processing wastes are indicated, including canery, poultry, meat packing, dairy, and beet sugar refinery wastes. In-plant control, screening, grease recovery, biological treatment, trickling filters, activated sludge, lagoons, spray irrigation, anaerobic digestion treatment, solids disposal, and by-product recovery are discussed. Costs are considered. Odors from coffee roasting, the discharge of solvent vapors from the manufacture of cans, and other air pollution problems connected with the food industry are indicated, as well as the various control methods such as incineration which are utilized. Plant damage from air pollution is considered.

25951 **APTIC NO. 47442**

Goldman, Thomas Milton, Robert Lamar Jordan, and Norman Eldred Wilson

REGENERATION OF CHLORINE-SATURATED ACTIVE CARBON. *(Verfahren zum Regenerieren von mit adsorbiertem elementarem Chlor gesaettigten Aktivkohleschichten). Text in German. (Stauffer Chemical Co., New York) W. Ger. Pat. Appl. 2,151,161. 6p., Oct. 14, 1971. (3 claims).*

Sulfur dioxide was passed through 454 kg activated carbon saturated with chlorine at 34 kg/day for 24 hr to completely remove the Cl which resulted from the manufacture of hydrogen chloride using potassium chloride and sulfuric acid.

25952 **APTIC NO. 47456**

Jonke, A. A., G. J Vogel, L. J. Anastasia, R. L. Jarry, D. Ramaswami, M. Haas, C. B. Schoffstoll, J. R. Pavlik, G. N. Vargo, and R. Green

REDUCTION OF ATMOSPHERIC POLLUTION BY THE APPLICATION OF FLUIDIZED- BED COMBUSTION. ANNUAL REPORT. JULY 1970 - JUNE 1971. *Argonne National Lab., Ill., Chemical Engineering Div., Office of Air Programs EPA-IAG-0020, 112p., 1971. 13 refs.*

NTIS: ANL/ES-CEN-1004

The combustion of fossil fuels in a fluidized bed consisting of partially reacted limestone was studied to determine the effect of operating variables on pollutant sulfur dioxide and nitrogen oxide emission. Coal was burned with either an excess or deficiency of oxygen in a 6-inch-diameter bench-scale combustor operating at atmospheric pressure with a bed of partially reacted limestone (which is the acceptor for the sulfur compounds released during combustion). The mechanism of sulfur capture was studied. Preliminary data were obtained on conditions for the regeneration of the sulfur-containing acceptor for recycle to the combustor. A mathematical model was developed to predict the retention of sulfur at different operating conditions when coal is burned in a fluidized bed. The potential of fluidized-bed combustion for the control of hydrogen chloride emissions was also studied experimentally. (Author abstract modified)

25953 **APTIC NO. 47677**

Kemmer, Frank N.

POLLUTION CONTROL IN THE STEEL INDUSTRY. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 10, p. 10-3 to 10-20.*

Water requirements and typical contaminants, air requirements and contaminants, and solids handling are discussed for the steel industry. Particulates, sulfur compounds, carbon monoxide, cyanides, fluorides, and benzene compounds are the most frequently encountered air contaminants. Waste water problems are considered for blast furnaces, casting operations, foundries, open hearth furnaces, basic oxygen furnaces, electric furnaces, rolling mills, sinter plants, heat treatment, acid pickling, vacuum degassing, coke plants, slag plants, utilities, and maintenance shops. The basic cleaning devices for waste gases are simple gravity separators, wet scrubbers, electrostatic precipitators, and baghouse filters. Control device selection is considered.

25954 **APTIC NO. 47759**

Lancy, Leslie E.

POLLUTION CONTROL IN PLATING OPERATIONS. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 12, p. 12-15 to 12-16.*

Air pollution problems connected with the electroplating industry are considered. Fumes from nitric acid, hydrochloric acid in the exhaust discharge, and entrained acids and alkalies such as chromic acid, and caustic soda in the exhaust air discharge are mentioned, as well as dust from grinding, polishing, and sandblasting, and solvent vapors. Fume washers, packed tower fume scrubbers, dust collectors, solvent recovery and catalytic oxidation systems are indicated for the control of these problems.

25955 **APTIC NO. 47683**

Lane, Bruce S.

POLLUTION CONTROL IN THE PHARMACEUTICAL INDUSTRY. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 17, p. 17-1, 17-2, 17-18 to 17-34.*

Air pollution problems connected with pharmaceutical plants are more likely to be the problems of the larger companies in which many of the industrial operations parallel those of the chemical industry. With very few exceptions, the most serious problems relate to manufacturers who operate fermentation plants in the production of antibiotics and steroids. Dust is one of the industry s greatest concerns, since dust inside the plant may cause contamination of one drug by another one. It is absolutely essential that penicillin dust is not present in areas where other pharmaceuticals are manufactured, since it is one of the materials capable of causing extremely toxic reactions. A very useful method for removing many pollutants that result from process operations has been the Rotoclone wet scrubber. Scrubbers are also useful for problems connected with chemical production. Incineration of the vent gases is often a satisfactory solution to fermentation process problems, although it is also agreeable to pipe the vent gases to a boiler house and use them for combustion air. Good housekeeping throughout the entire fermentation plant area will do much to improve an odor situation. Exhaust systems in facilities which utilize radiological products are described, as well as control methods to be utilized in research facilities and boiler plants. Incinerators, materials reclamation and regeneration, and waste treatment facilities are also considered. Public affairs and legal implications are mentioned.

25956 **APTIC NO. 47457**

Latenstein, Anthonie van

MANUFACTURE OF ROASTED, CALCINED, OR SINTERED ORE PELLETS. *(Verfahren und Vorrichtung zur Herstellung geroesteter, gebrannter oder gesunterter (Erz-)Pellets). Text in German. (Koninklijke Nederlandsche Hoogovens en Staalfabrieken N. V., Ijmuiden (Netherlands)) W. Ger. Pat. Appl. 2,143,372. 15p., Aug. 30, 1971. 6 refs. (10 claims).*

Process and equipment for the calcination, roasting, or sintering of ore pellets from pulverized ore are described, where the dust formation during transportation is avoided by cooling the pellets to a maximum temperature of 60 C and by spraying water on the pellets. The moisture content of the pellets is kept between 2 and 5%, irrespective of the actual performance of the conveyor belt. More water spray is added before screening and discharge into storage facilities.

25957 **APTIC NO. 47796**

Maier, William Howard

ABSORPTIVE REMOVAL OF SELECTED COMPONENTS FROM A GAS STREAM. *(Absorptionsverfahren). Text in German. (Universal Oil Products, Des Plaines, Ill.) W. Ger. Pat. Appl. 2,137,183. 22p., July 24, 1971. (8 claims)*

A procedure for the absorptive removal of acid gases, e.g., hydrogen sulfide and carbon dioxide, from gas streams is presented. The gas is contacted under high pressure with an uncharged absorption medium; the charged medium is flashed into a low-pressure zone where additional medium is added; and the mixture is then separated into purified gas and a supercharged medium. The medium is regenerated by heating until the gaseous components separate.

25958 **APTIC NO. 47673**

Moore, William W. and Norman W. Frisch

AIR POLLUTION CONTROL PROGRAMS AND SYSTEMS. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 5, p. 5-1 to 5-37.*

A generalized treatment of the control technology available and the critical factors involved in the determination of the basic approach to the selection of a particular air pollution control system is presented. Pollution control by process change is discussed, as well as particulate control by removal and the removal of gaseous and odorous pollutants. Characteristics of particles and particle dispersoids are indicated, and typical gaseous pollutants and their sources are listed. Cyclones, scrubbers, fabric filters, and electrostatic precipitators are described for the removal of particulates. Adsorption, absorption, combustion, masking and counteraction methods are outlined for the removal of gaseous and odorous pollutants. Fixed bed and continuous adsorption are included, as well as efficient regeneration of the adsorbent. The kinetics of absorption is discussed. Advantages and disadvantages of packed and plate towers are listed. Combined particulate removal and gas absorption is mentioned. Flame and catalytic combustion are described; catalytic oxidation versus flame incineration is debated. Dispersion, topographic effects, and ground level concentration calculations are discussed.

25959 **APTIC NO. 47468**

Morgan, John Edward

APPARATUS AND METHOD FOR WET BURNING BLACK LIQUOR. *(Verfahren und Vorrichtung zum Nassverbrennen von Natronablauge). Text in German. (Associated Pulp and Paper Mills Ltd., Melbourne (Australia)) W. Ger. Pat. Appl. 2,143,077. 25p., Aug. 27, 1971. (23 claims).*

A method and apparatus for the wet burning of soda black liquor are described. Spent pulp liquor is burned nearly completely by passing air through the liquid at 70-225 atm and 316-329 C, preferably at 320 C, in a first oxidizing stage in parallel flow. After inert gases and gaseous oxidation products are separated from the partly oxidized liquid phase, the latter is subjected to further oxidation by oxygen or oxygen-rich air in counterflow in a second stage. The first and second oxidizing stages are formed by the lower and upper zones of the same reactor.

25960 **APTIC NO. 47790**

Morita, Tomijiro, Isao Funabashi, and Sugai Isao

MANUFACTURE OF GYPSUM FROM FLUE GASES CONTAINING SULFUR DIOXIDE. *(Verfahren zur Herstellung von Gips aus Schwefeldioxid enthaltenden Abgasen). Text in German. (Kureha Chemical Industry Co., Ltd. (Japan)) W. Ger. Pat. Appl. 2,153,098. 12p., Oct. 25, 1971. (3 claims).*

Gypsum can be manufactured from sulfur dioxide in dust-free flue gas by absorption in an aqueous solution of sodium sulfite, conversion to calcium sulfite with calcium hydroxide, and atmospheric oxidation. An example is described in which the flue gas was first freed of 60% of its dust content by circulating water at a 32% relative humidity. At 60 C, the gas was passed over an 18% Na_2SO_3 solution to give 41 kg of 8% sodium hydrogen sulfite and 15% Na_2SO_3 solution/hr. The gas leaving the absorption plant contained 0.0083 vol% SO_2 a 94.6% reduction. The solution was mixed at 80 C with a 20% $Ca(OH)_2$ slurry at a 2.2:1 $NaHSO_3$-$Ca(OH)_2$ mole ratio to give 2.4 kg $CaSO_3$, which was separated, washed, and slurried with water containing 5% $CaSO_3$. The filtrate containing 17.2% Na_2SO_3 was recycled to the absorption plant. The $CaSO_3$ suspension was oxidized with 2 cu m air/hr at 80 C to give 2.7 kg gypsum of 98.4% purity/hr.

25961 **APTIC NO. 47797**

Niekerk, Jan Lodewikus Jooste van

REFINING PROCESS FOR IMPROVING THE COMBUSTION OF COAL. *(Verfahren zur Veredelung von Kohle). Text in German. (Assignee not given.) W. Ger. Pat. Appl. 2,141,422. 18p., Aug. 18, 1971. (19 claims).*

A process for treating coal before or during combustion with sodium carbonate or sodium bicarbonate to decrease soot and smoke emissions and improve the combustion process is presented. The coal may also be reduced to a suitable size prior to treatment with surfactant and a bonding material, e.g., Triton B-65.

25962 **APTIC NO. 47522**

Parnell, Calvin B., Jr. and Roy V. Baker

AN AUTOMATIC CONTROL SYSTEM FOR DIRECT COMPARISONS OF AIR POLLUTION ABATEMENT EQUIPMENT. *Preprint, American Society of Agricultural Engineers, St. Joseph, Mich., 14p., 1971. 3 refs. (Presented at the American Society of Agricultural Engineers, Winter Meeting, Chicago, Ill., Dec. 7-10, 1971, ASAE Paper 71-567.)*

A control system was designed to improve procedures for comparing collection efficiencies of air pollution abatement equipment for condenser exhausts of cotton gins. This system allowed for a much larger number of replications and a means for statistically removing the effect of a nonuniform dust concentration of the unfiltered air. The two variable timers used in this control system are standard multi-contact program timers, each having five adjustable cams for actuating microswitches. The timers were the heart of the control system. To determine collection efficiencies, air samples were taken of the unfiltered exhaust air and of the air discharging from each of the test filters. The samples were obtained by means of conventional high-volume air samplers. It was required that the control circuit turn on and off the appropriate air sampler for each of the filters. (Author summary modified)

25963 **APTIC NO. 47795**

Poncet, Pierre and Rene Trempu

PHYSIOCOCHEMICAL PURIFICATION OF SMOKE AND GASES CONTAINING SULFUR DERIVATIVES. *(Verfahren zur physikalisch-chemischen Reinigung von Rauch und Gasen und Vorrichtung zu dessen Durchfuehrung). Text in German. (Compagnie Industrielle des Telecommunications Cit-Alcatel, Paris (France)) W. Ger. Pat. Appl. 2,125,036. 15p., May 19, 1971. (10 claims).*

Sulfur dioxide containing waste gases from fuel combustion sources can be purified by scrubbing with diluted ferric sulfate and conversion to sulfur trioxide and ferrous sulfate. To regenerate the acid wash water, the solution is neutralized and oxidized by a passage of air. For complete conversion, the oxidation should be effected in the presence of sulfuric acid; it is advantageous to oxidize half of the wash water directly with air and to neutralize the other half with Fe or an Fe compound. At least a part of the acid wash water may be dehydrated by contact with the unwashed gas stream.

25964 **APTIC NO. 47686**

Reichmann, Robert G.

POLLUTION CONTROL IN THE AEROSPACE AND ELECTRONICS INDUSTRIES. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 19, p. 19-1 to 19-22.*

The items produced by the aerospace and electronics industry are as diversified as the processes that are required to complete production. Though most plants in this field employ many processes similar to those used in other industries, certain special situations continually consume their time and energy. Since they are in the public limelight both locally and nationally, they must present a stronger public limelight image than most other industries. As they tend to deal with relatively new, exotic metals, they are faced with significantly difficult pollution problems. Some of the types of control agencies relevant to the aerospace and electronics industry which are found in a community are listed. Federal controls and codes, including military specifications, are mentioned. Conflict at the community level is considered. Safe working levels for mineral dusts and metallic dusts, fumes, and vapors, are presented. Dust collection methods includ electrostatic precipitators, filters, dry collectors and scrubbers. Community controls and codes pertaining to stack emissions are considered. Incinerator controls are indicated. Hydrocarbon pollution control is discussed, and a solvent classification is presented. A survey of aerospace-electronics manufacturing processes was conducted by a number of companies to determine which processes use hydrocarbon materials that may be effected by the Los Angeles solvent emissions regulation. Solvent control methods include carbon absorption, incineration, and solvent substitution. Methods available for the disposal of liquid wastes and the relevant codes and regulations are considered, as well as water conservation and reclamation. Plants handling or using radioactive materials are required under federal law to be licensed to permit their use.

25965 **APTIC NO. 47674**

Ross, R. D.

POLLUTION WASTE CONTROL. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 7, p. 7-1 to 7-46.*

Air pollution, water pollution, land pollution, and interpollution of resources are defined. Many so-called safe treatment and disposal methods have merely caused a problem elsewhere. Most gaseous wastes are easily treated from a chemical biological viewpoint. They contain known contaminants which can be absorbed, adsorbed, oxidized, separated, or otherwise removed by existing conventional methods. Therefore, it is not the type of contaminant so much as the total quantity of gas which must be handled that makes the gaseous waste disposal problem a difficult one. Direct flame, thermal, and catalytic incineration of waste gases are discussed. The autoignition temperature of some common organic compounds is given. Catalyst poisons, heat recovery, construction materials, and economics are also considered for waste gas incineration. Olfactory thresholds, odor counteraction methods, and the oxidation of odors by potassium permanganate solutions are discussed. Purposes of high stacks are indicated, as well as ground level concentration determinations, topographic and meteorological factors, stack design, and materials of construction. Methods for the control of sulfur dioxide and oxides of nitrogen are enumerated. The disposal of liquid wastes is considered, including incineration of combustible and partially combustible waste. Economic factors are cited. Other oxidation methods available for the control of liquid wastes comprise the use of rotary kilns, multiple hearth furnaces, fluidized beds, flash drying systems, wet air oxidation, and atomized suspension which is actually a pyrolysis process rather than direct oxidation. Deep-well disposal, lagoons and ponds, dilution, and land disposal are also discussed. Pretreatment and solids incineration are considered, as well as heat recovery from solid waste incinerators, composting, and sanitary landfill.

25966 **APTIC NO. 47514**

Sakata, Hatsuzo

GAS PURIFICATION. III. REMOVAL OF SULFUR DIOXIDE TRACES FROM GAS BY MANGANESE FERRITE. *(Gasu no seisei kenkyu daisanpo. Mangan feraito ni yoru gasu-chu no biryo nisanka io no jokyo). Text in Japanese. Nagaoka Kogyo Koto Semmon Gakko Kenkyu Kiyo (Res. Rep. Nagaoka Tech. Coll.), 7(4):309-328, 1971. 8 refs.*

Manganese ferrite was tested as a desulfurization catalyst to remove sulfur dioxide from industrial gas streams, exhaust gas, and the atmosphere. The manganese ferrite was synthesized by wet oxidation using ammonium oxalate or ammonium carbonate as the precipitating agent and heating the precipitate at 300-400 C. The catalyst was tested at various conditions of temperature, gas velocity, and SO2 concentrations. Desulfurization ability was greatly influenced by temperature, but was not affected by either velocity or SO2 concentration. The most suitable temperature was 350 C. The mechanism of manganese ferrite formation and desulfurization was examined.

25967 **APTIC NO. 47537**

Sasaki, Mitsuyuki, Satoru Takemichi, Eizo Ishiyama, Shigeki Morimoto, and Takanori Kuwashima

EFFECT OF HEAVY-OIL ADDITIVES ON HAZARDOUS-GAS SUPPRESSION IN BOILER WASTE GAS. *(Juyu boira nensho haigasu-chu no yugai seibun ni oyobosu juyu tenkazai no seino). Text in Japanese. Hokkaidoritsu Kogyo Shikenjo Hokoku (Rep. Hokkaido Prefect. Ind. Exp. Stn.), no. 177:3-12, 1971. 12 refs.*

Tests were conducted to examine the effectiveness of oil additives on sulfur dioxide elimination in combustion gas. Five kinds of additives were selected for an analysis of composition, a sludge dispersion test, and a combustion test in a small boiler. The main consistency of these additives was either aromatic amine, manganese or magnesium salts of carbonic acid, organon manganese carbonyl, or magnesium hydroxide, dissolved in tar light oil or kerosene. For dispersion of sludge, manganese carbonic acid and magnesium salt were effective over a long period of time, and organon manganese carbonyl was slightly effective. Aromatic amines and magnesium hydroxide were totally ineffective. Combustion gas showed that these additives had no effect on SO2 control. The important factor for sulfur trioxide formation is the combustion condition (air ratio, combustion quantity) which influences the amount of SO3 to 90%. When air ratio and combustion quantity were small, Mg(OH)2, aromatic amines, and C9H703Mn were effective, and manganese carbonic acid and magnesium salts were completely ineffective.

25968 **APTIC NO. 47681**

Schlesinger, Herbert A., Emil F. Dul, and Thomas A. Fridy, Jr.

POLLUTION CONTROL IN TEXTILE MILLS. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 15, p. 15-1 to 15-30. 8 refs.*

Processing methods, waste sources and qualities, and treatment methods associated with textile manufacturing are discussed. Cotton, wool, and synthetics are included. Toxic substances, nutrient deficiency, shock loads, synthetic detergents, waterborne waste fibers, equalization, segregation, pH adjustment, and nutrient addition are discussed for cotton. Water and chemical recovery and reuse are considered, as well as waste surveys and pilot investigations. Wastewater treatment with activated carbon is considered. Lint filtration, the problem of fumes from wool carbonizing, and odors emanating from dyeing and finishing operations are discussed. Wastes from woolen mills and synthetic fiber finish mills are analyzed for pH range, total solids, and biological oxygen demand. The pollution potential of the various operations such as bleaching and dyeing is indicated. Cotton finishing process chemicals, consumption, and BOD are listed.

25969 **APTIC NO. 47590**

Seibel, Robert V. and Richard E. Winschel

EVALUATION OF THE FLUIDIZED BED COMBUSTION PROCESS. VOLUME III. APPENDIX D. INDUSTRIAL BOILER DESIGN REPORT. *Westinghouse Research Labs., Pittsburgh, Pa., Office of Air Programs Contract CPA 70-9, APTD-1167, 207p., Nov. 1971.*

NTIS: PB 213152

The design and market factors for industrial application of the fluidized bed combustion steam generator were investigated. The design criteria for the fuel and limestone system, steam generator, primary ash collector, economizer, ash handling system, controls and instruments, electrostatic precipitator, wet scrubber-slurry dewatering, dry solids system, and wet scrubber system are specified. Optimum operating conditions and design problem areas are delineated. Industrial steam generator users will not respond favorably to fluidized bed combustion units until there is an operating unit utilizing all the equipment and application rules of the proposed system. Present technology is sufficient to research the problem areas. Market possibilities, however, are not sufficient to support the necessary funding on a unilateral commercial basis. (Author conclusions modified)

25970 **APTIC NO. 47687**

Smith, Stanley K.

EUROPEAN INDUSTRIAL POLLUTION CONTROL PRACTICES. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 20, p. 20-1 to 20-19.*

While the Europeans have not developed any major breakthroughs in pollution control processes, what they have developed are unique applications to their economic and social situations and a more sophisticated working relationship between industry and government enforcing agencies. Control is generally effected through a system of permits which industries must obtain before they can operate. Generally, an attitude of best practical means is adopted. Legal sanction is rare for enforcement; instead education and persuasion are used to ensure compliance. Research for pollution control is generally carried out by industry, although in England and Holland the government has research laboratories where industry can purchase research capability at nominal cost. To illustrate the characteristics of European pollution control practices, a series of industrial operations are presented as examples. In Leverkusen, Germany, the Bayer chemical plant is considered a model of integrated pollution control, as it handles the wastes from manufacturing several thousand chemical products. A refuse incineration plant in Munich, a cement plant in Switzerland, electrical manufacturing in Germany, petroleum refining in Holland, and sewage treatment are discussed.

1970

25971 **APTIC NO. 47464**

Adolphi, Hans Velten

GAS-LIQUID CONTACTING COLUMNS WITH NON-FLOODING PLATES. *(Stoffaustauschkolonne mit ueberlauflosen Boeden). Text in German. (VEB Maschinen- und Apparatebau Grimma (West Germany)) W. Ger. Pat. Appl. 2,044,928. 6p., Sept. 11, 1970. (2 claims).*

Flooding in a gas-liquid contacting column can be eliminated by inserting baffle plates under the column plates. The characteristic k value of the baffle plate is 5-80% of that of the column plate (where k is equal to df squared and d is the diameter of the plate holes and f the ratio of the area of the holes to that of the plate). The amount of the liquid carried by the gas from the baffle plate to the column plate must be inversely proportional to the ratio of the distance between plates to the jet height. The area of the holes of the baffle plate can be adjusted.

25972 **APTIC NO. 47800**

Brown, Hart

APPARATUS AND METHOD FOR CONTACTING SOLID PARTICLES AND LIQUIDS. *(Kontaktverfahren und Vorrichtung zur Durchfuehrung dieses Verfahrens). Text in German. (Assignee not given.) W. Ger. Pat. Appl. 2,045,492. 75p., Sept. 15, 1970. (49 claims).*

An apparatus is described to effect countercurrent contact between solid particles and liquids. It is applicable to ion-exchange processes for water softening, purification of biological substances, as well as other mass transfer processes. In a multiple column, for example, aqueous magnesium sulfate is pumped upwards and contacted with a downward stream of a sodium-charged resin. In a parallel stream, the spent Mg-charged resin is pumped upwards through a sodium chloride solution to regenerate the resin, and then fed to the top of the main column. A similar device is described for extracting uranium from a solution.

25973 **APTIC NO. 47445**

De Respiris, Donald L.

APPARATUS AND METHOD FOR SEPARATING CARBON DIOXIDE FROM GASEOUS MIXTURES. *(Verfahren und Vorrichtung zum Abtrennen von Kohlendioxid aus Gasgemischen). Text in German. (TRW Inc., Cleveland, Ohio) W. Ger. Pat. Appl. 2,004,449. 14p., Jan. 31, 1970. (10 claims).*

Carbon dioxide can be separated from gaseous mixtures and, in particular, air, by passing the mixture into an electrolytic cell consisting of corrosion-resistant electrodes separated by asbestos fiber saturated with 5N potassium carbonate. On contact with the cathode, the CO2 and oxygen in the mixture are transported as carbonate ion to the anode where contact with a supply of hydrogen converts the carbonate ion to CO2 and water. The apparatus also comprises an electrolyte cell for conversion of H2O to H and O, means to convey the H to the other cell, and means to convey the CO2-free mixture to the air.

25974 **APTIC NO. 47463**

Hoeke, Engelbert

WET REMOVAL OF DUST FROM FLUORINE-CONTAINING EXHAUST GASES IN ALUMINUM MANUFACTURE. *(Verfahren zur Nassentstaubung fluorhaltiger Abgase bei der Herstellung von Aluminium). Text in Ger-*

man. Fried Krupp G.m.b.H., Essen (West Germany)) W. Ger. Pat. Appl. 2,039,588. Aug. 8, 1970. (3 claims).

Dust in fluorine-containing exhaust gases from aluminum manufacture can be removed by a wash solution with a pH equal to or greater than 10.5 and a salt content of less than 6%. The salt concentration can be maintained by replenishing the washing solution with fresh water.

25975 **APTIC NO. 47786**

Link, Gerhard

REMOVAL OF DIMETHYL ETHER FROM GASES. *(Verfahren zur Entfernung von Dimethylaether aus Gasen). Text in German. (Assignee not given.) W. Ger. Pat. Appl. 2,047,603. 5p., Sept. 28, 1970. 4 refs. (2 claims).*

A process for the removal of dimethyl ether from waste gases with about 69% hydrogen, 5% carbon monoxide, and 0.4% dimethyl ether from the methanol synthesis process is described. The dimethyl ether is absorbed from the waste gas by scrubbing with water under pressure; and the absorbed dimethyl ether is stripped from the scrubbing solution by a fuel gas. Any watery solution in which the dissolved matter has no partial pressure can be used as wash liquid. The hydrogen obtained can be further purified and used in ammonia manufacturing.

25976 **APTIC NO. 47462**

Schoenherr, Dietrich, Hans Thumm, and Hermann Trueb

CYCLONE FOR SEPARATING SOLIDS FROM HOT, METAL CHLORIDE-CONTAINING GASES. *(Zyklon zum Abscheiden von Festoffen aus heissen metallchloridhaltigen Gasen). Text in German. (Titangesellschaft m.b.H, Leverkusen (West Germany)) W. Ger. Pat. Appl. 2,042,907. 16p., Aug. 29, 1970. (6 claims).*

In titanium tetrachloride production, a cyclone is described for separating solids from hot gases containing metal chlorides and chlorine. The cyclone comprises a central tube supported from a top outlet nozzle. The tube has double walls which enclose a pipe coil or baffles to cause the liquid or gas coolant to take a spiral or festooned path within the annulus. The tube has a rough base layer such as formed by titanium dioxide applied by plasma flame. This layer then has a low thermal conditioned coating. The apparatus avoids the need for fragile ceramics, thus permitting the use of metals.

25977 **APTIC NO. 47794**

Weber, Heinrich, Gustav Choulat, Helmut Fritzsche, and Dieter Laufhuette

AMMONIA DISPOSAL FROM COKE OVEN GASES. *(Verfahren zur Verbrennung oder Zersetzung des bei der Aufbereitung von Kokerei- oder Gaswerksgas anfallenden Ammoniaks). Text in German. (Firma Carl Still, Recklinghausen (West Germany)) W. Ger. Pat. Appl. 2,054,336. 7p., Nov. 5, 1970. 7 refs. (6 claims).*

A technique for the removal of ammonia from coke oven gases by absorption in sulfuric acid, ammonium bisulfate, or ammonium phosphate, mono basic, is presented. The resulting solutions are thermally decomposed to produce NH_4HSO_4 or $NH_4H_2PO_4$, respectively, which are recycled to the absorption process and NH_3. The NH_3 is burned with air or thermally decomposed by passing its mixture with combustible gases and air through a decomposition zone. The gases leaving this zone are burned completely with air or are used for leaning of calorie-rich gases. The combustion heat is used for the thermal decomposition of the substances from the NH_3 absorption. The combustion gases are free of products from hydrogen sulfide or hydrogen cyanide combustion.

25978 **APTIC NO. 47793**

Wilson, Harold Woodrow

WET PROCESS FOR SEPARATING AND RECOVERING SULFUR CONSTITUENTS FROM SULFUR DIOXIDE-CONTAINING STACK GASES. *(Verfahren zum Auffangen von Schwefeldioxyd-Gas). Text in German. (Golden Cycle Corp., Colorado Springs, Colo.) W. Ger. Pat. Appl. 2, 045,605. 25p., Sept. 15, 1970. (15 claims).*

A process was developed to remove and recover sulfur from sulfur dioxide containing waste gases. The gas is passed into a stirred aqueous suspension of 200-mesh particles of a mixture of metal oxides, e.g., iron oxides, and silicates (of calcium, magnesium, aluminum, manganese, or other metal) with a pH of 8-9. Naturally occurring minerals or slags, e.g., from refining of pyritic copper ores, may be used. The SO_2 forms hydrogen sulfites. A gel is formed which can be dried and then stored or used as an immediate source of SO_2. For preparation of elementary sulfur, the gel is treated with hydrogen sulfide in a waste gas or formed in situ after the addition of powdered pyrite and a mineral acid solution.

1967

25979 **APTIC NO. 47460**

Hoffmann, Hanspeter

HOT GAS FILTER ASSEMBLY WITH HEAT-RESISTANT FOIL. *(Filtertasche fuer Filter zum Abscheiden von Staub aus heissen Abgasen). Text in German. (Standard Filterbau G.m.b.H., Muenster (West Germany)) W. Ger. Pat. Appl. 1,607,757. 4p., Sept. 27, 1967. 4 refs. (5 claims).*

A filter chamber for removing dust from hot waste gases is described which consists of filter mats of heat-resistant mineral or glass wool fleece covered on both sides by woven wire cloth and clamped between a frame and clamping strips. In the clamping zone, the filter mats are provided with a heat resistant foil, preferably aluminum, between the fleece and the woven wire cloth.

1966

25980 **APTIC NO. 47547**

Gambs, Gerard C.

REPORT ON FLY ASH IN ENGLAND, EUROPE, AND SOVIET UNION. *Preprint, Consolidation Coal Co., Library, Pa., Research Div., 25p., Jan. 1, 1966.*

Since it was known that England and Europe are far ahead of the United States in the commercial utilization of fly ash, a trip was arranged to visit England, France, West Germany, and the Soviet Union. Fly ash, which is the fine, powdered ash resulting from the burning of coal in a pulverized-coal boiler, has been a disposal problem to the electric utility industry for many years. Current and future production of fly ash and current utilization are indicated for the countries studied. The most important use to date from a tonnage standpoint is the use of fly ash as a structural fill. This has been developed in England to the point where they used over 1.3 million tons in 1965 and will use over 2 million tons in 1966. The other very important market is the use of fly ash either in the manufacture of a portland-pozzolan cement or directly in the concrete mix as a partial replacement for cement. This market offers the highest realization to the power plant for the sale of fly ash and it is also potentially large enough to dispose of millions of tons of fly ash per year. The use of fly ash for the manufacture of a lightweight aggregate construction material is a third important market. Recommendations are made.

1964

25981 **APTIC NO. 47467**

FLUE GAS REMOVAL FOR TUNNEL KILNS. *(Verfahren zum Beeinflussen der Rauchgasstroemung in der Anwaermzone von Tunneloefen und Tunnelofen zur Durchfuehrung des Verfahrens). Text in German. (Keller Ofenbau G.m.b.H., Laggenbeck (West Germany)) W. Ger. Pat. Appl. 1,433,856. 4p., March 24, 1964. 3 refs. (5 claims).*

A method and device for flue gas removal from the preheating zone of tunnel kilns are described. The flue gas flow through the preheating zone is regulated by drawing off the gas at the kiln entrance over the entire tunnel cross section using separately adjustable suction apertures. The free cross section of the suction apertures is adjustable by slides or flaps. The suction sluice holding the suction apertures is in the form of a two-part door, and is connected by flexible conduits with a suction manifold. The flue gas suction system ensures even temperature in the preheating zone of the kiln.

1963

25982 **APTIC NO. 47459**

Rausch, Gerhard

ELECTROSTATIC SEPARATOR FOR SEPARATION OF LIQUID AND SOLID PARTICLES IN WASHED AIR STREAM. *(Vorrichtung zur Abscheidung fester und fluessiger Schwebeteilchen, die sich in einem durch nasse Waesche gedrueckten Luftstrom befinden). Text in German. (Homap Etablissement, Vaduz (West Germany)) W. Ger. Pat. Appl. 1,471,620. 4p., Aug. 19, 1963. 16 refs. (4 claims).*

Equipment is described for the separation of solid and liquid particles after a wet wash, which consists of an electrostatic separator followed by a deionizing unit installed in a pipe of enlarged diameter to reduce air velocity and turbulence and increase residence time in the vicinity of the electrodes. Both units are electrically insulated. The electrostatic separator consists of a central cathode parallel to the vessel and anode at the wall. Separated particles fall downward against the air stream into a trough from which they are collected. The deionizing unit comprises many separate cathode and anode units across the diameter of the vessel. The deionizing unit increases formation of ozone which increases the tendency to obliterate germs and viruses remaining in the air after the water wash.

1962

25983 **APTIC NO. 47466**

Fritsch, Peter

RECOVERY OR REMOVAL OF HYDROGEN FLUORIDE FROM GASEOUS MIXTURES. *(Verfahren zur Gewinnung bzw. Entfernung von Fluorwasserstoff aus Gasmischungen). Text in German. (Farbwerke Hoechst AG, Frankfurt am Main (West Germany)) W. Ger. Pat. Appl. 1,567,494. 4p., Aug. 16, 1962. 5 refs. (2 claims).*

In a bubble-cap column or an other cascade arrangement, a mixture containing hydrogen fluoride, hydrogen chloride, and perhaps organic compounds, can be scrubbed at minus 20 to 50 C with 2-30 g water or aqueous HCl solution for each mole HF to be absorbed. A polyethylene column having 30 bubble-cap trays was filled with approximately 4 l of concentrated HCl. A gas mixture consisting of 2 cu m/hr HCl, 1.2 cu m/hr nitrogen, and 80 g/hr HF was introduced at the bottom. At the top of the column, 160 ml of concentrated HCl was introduced. The lowest two trays were maintained at minus 3 C by circulating the scrubbing liquid contained therein through an outside cooler. The gaseous mixture leaving the top of the column contained 0.0007 wt% HF based on HCl.

1954

25984 **APTIC NO. 47461**

True, Ronald G.

ELECTROSTATIC AIR FILTER. *(Elektrostatisches Filter). Text in German. (American Air Filter Co., Inc., Louisville, Ky.) W. Ger. Pat. Appl. 1,457,264. 9p., May 29, 1954. 8 refs. (2 claims).*

An electrostatic filter is described which has easily removable elements situated between parallel insulated grids, with high tension between them when operating. The elements can be removed or changed by moving the low and high tension contact levers to permit access. The filter element consists of a corrugated plate of a material which has on its top side a coating of a conducting substance such as a suitably bonded aluminum powder. The filter element is fixed between high and low tension grids consisting of wires and bars at right angles to the corrugation and in electrical contact with the conducting coating. The electric field is therefore in the level of the folds of the filter element and an effective separation of dust particles is achieved.

MEASUREMENT METHODS

1972

25985 **APTIC NO. 47476**

California Univ., Livermore, Lawrence Radiation Lab.

ENVIRONMENTAL MONITORING CONSTANT-FLOW AIR SAMPLER. *In: Hazards Control Progress Report No. 42. January through April 1972. TID-4500, UC-41 Health and Safety, p. 9-10, July 26, 1972.*

NTIS: UCRL-50007-72-1

To eliminate frequent mechanical failure and variable flow rates, existing samplers were replaced with new instruments in the environmental monitoring program of the Lawrence Radiation Lab. at Livermore, Calif. A rugged heavy-duty positive displacement air pump equipped with a constant-flow valve is now used. The constant flow rate is 25 cu ft/min through an 8 by 10-inch Whatman 41 filter.

25986 **APTIC NO. 47403**

Alex, W.

PRINCIPLES AND CLASSIFICATION OF COUNTING METHODS PARTICLE SIZE ANALYSIS - PART 4. *(Prinzipien und Systematik der Zaehlverfahren in der Teilchengroessenanalyse). Text in German. Aufbereitungs-Technik, 13(11):723-732, 1972. 66 refs.*

Counting methods play an important role in particle size analysis, especially since quantitative television microscopes, the Coulter counter, and light scattering equipment have quick performance. Distributions and sample size are discussed mathematically, and the principles of counting methods are surveyed and classified. The indirect (imaging) methods use macroscopic and microscopic photography, transmission and scanning electron microscopy, electron probe x-ray microanalysis, micrometers, graticules, the Zeiss TGZ 3, quantitative television microscopes, the Zeidler counter, and holography. The direct methods are divided into mechanical counting and counting of field disturbances -- the fields being electrical (Coulter counter), aerodynamical (Langer counter), or optical (Schleusener counter, flow photometers, scattered light counters, and spectrothermal counters).

25987 **APTIC NO. 47664**

Beitz, Liselotte and Ulricht Jecht

X-RAY FLUORESCENCE ANALYSIS IN THE PROTECTION OF THE ENVIRONMENT. *(Rontgenfluorescensanalys inom miljovarden). Text in Swedish. Mod. Kemi, no. 9:28-29, Sept. 1972. 3 refs.*

Principles and applications of X-ray fluorescence analysis in the practice of environmental protection are reviewed. X-ray fluorescence analysis is suitable for the qualitative and quantitative investigations of liquid and particulate samples, often without any sample preparation. The limit of detectability ranges from 0.1 to 10 ppm for various elements, and it is inversely proportional to the atomic number. The reproducibility is or 0.2-5%. The precision, reproducibility, and detectability are largely dependent on the duration of the analysis which is usually about 40 sec. The determination of sodium, magnesium, phosphorus, potassium, calcium, copper, iron, lead, and arsenic in plants and of sulfur, phosphorus, lead, and arsenic in dust samples are the major uses of the X-ray fluorescence analysis.

25988 **APTIC NO. 47306**

Benarie

PRINCIPLES AND MEASUREMENT INSTRUMENTS APPLIED IN THE DETERMINATION OF SOLID PARTICLE CONCENTRATIONS EMITTED BY STACKS. *(Principes et appareils de mesure de la concentration des solides a l emission d une cheminee). Text in French. Colloq. Int. Homme, Air Eau, Paris, France, 1972, 8p. (June.)*

Principles of measurement and instruments for measuring solid particle concentrations are reviewed with special regard to their suitability for the determination of concentrations of stack emissions. While a great variety of physical principles have been proposed there is no available satisfactory, reliable instrument for the continuous measurement of stack emissions. Beta ray absorption measurement as realized in a commercial instrument using prometheum-147, carbon-14, or strontium-90 as an isotope is regarded as one of the best methods for the determination of mass concentrations. This semicontinuous instrument, with a sampling duration adjustable from 1 to 599 minutes, has a sensitivity of 0.3 mg/sq cm of the porous filter paper. Piezoelectric scales are expected to become suitable for automatic measurement in the near future. Light absorption and light scattering methods may be also suitable for concentration measurements. KONITEST instruments using the electric charge caused by the impaction of high-speed particles on an electrode as a measure of the particle concentration have been successfully applied in practice, except for adhesive dusts. Microdynamometric detectors, converting the impaction induced deflection of a sensitive membrane into an electrical magnitude, and the measurement of the flow resistance through a dust layer-covered filter are seen as being worth further studies. Other methods and instruments such as lidar, holographic, acoustic and flame-photometric instruments, hot-wire anemometers, and condensation nuclei counters are of no interest for stack emission particle concentration measurements.

25989 **APTIC NO. 47303**

Boeuf, Bernard

AIR POLLUTION: SELECTION OF AN INDUSTRIAL ANALYTICAL TECHNIQUE. *(Pollution atmospherique: choix d une technique analytique industrielle). Text in French. Colloq. Int. Homme, Air Eau, Paris, France 1972, 4p. (June.)*

Analytical methods of interest for industrial air pollution measurements are reviewed. An electrochemical method uses changes occurring in the conductivity of an electrolyte for the determination of sulfur dioxide. Polarographic methods are reserved for laboratory analysis. Coulometry represents a sensitive method, and pH-metry, used extensively, is not specific, and is affected by interferences due to bases. Gas chromatography represents a sensitive and specific, though non-continuous, method. A new gas chromatograph is suitable for the determination of the total hydrocarbon content minus methane at 2-3 minute intervals. Spectroscopic methods, such as the infrared absorption method applied to the determination of carbon monoxide, are credited with rather high degree of specificity and relatively high sensitivity. A new instrument, based on the little-known infrared emission method, is being developed for industrial analytical purposes. Chemiluminescence methods such as those used for the determination of nitric oxide and ozone, are not sensitive, though they are selective. Such a method using a solid-gas reaction is being studied. Spectrophotometric methods are both simple, specific and very sensitive.

25990 **APTIC NO. 47619**

Bretschneider, K., R. Fahnert, and J. Otto

GAS CHROMATOGRAPHIC ANALYSIS OF SOLVENTS IMPORTANT TO OCCUPATIONAL MEDICINE IN INDOOR AIR. QUANTITATIVE DETERMINATION OF INDIVIDUAL SUBSTANCES AND MIXTURES WITHOUT ENRICHMENT. *(Gaschromatographische Raumluftanalysen arbeitshygienisch bedeutsamer Loesungsmittel. Quantitative Bestimmungen von Einzelsubstanzen und Gemischen ohne Anreicherung). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 18(10):717-720, 1972. 13 refs.*

The suitability of gas chromatography for the determination of aromatic and aliphatic hydrocarbons, its halogenated derivatives, esters, alcohols, and ketones with a boiling point below 150 C was studied without enrichment of these substances at the sampling process. For sampling, the five to tenfold volume of the used gas collection vessel was drawn on or a gas collection vessel evacuated to less than 2 torr was opened at the point of sampling. The gas sampling vessels were warmed to 60 C. With the aid of an injection needle, 10 ml of the gas sampling vessel were pressed through the 1-milliliter loop of the gas sampling inlet valve. The gas chromatographic peaks were compared with the peak height of calibration gases and with the peak areas of calibration solutions. The gas chromatography was very suitable for determination of these substances even after 24 hours. For substances whose boiling point is above 150 C and whose maximum allowable working place concentration is below 10 mg/cu m, the method is not applicable.

25991 **APTIC NO. 47318**

Buerkholz, Arnim

GRAIN SIZE DETERMINATIONS ON THE GRAVITY SCALE WITH CONVENTIONAL AND IMPROVED SEDIMENTATION VESSELS. *(Korngroessenbestimmungen auf der Schwerkraftwaage mit herkoemmlichen und verbesserten Sedimentationsgefaessen). Text in German. Staub, Reinhaltung Luft, 32(11):442-446, Nov. 1972. 14 refs.*

Particle size can be determined using a measurement of the amount sedimentation on balances. Since seepage occurs below the collecting tray in conventional sedimentation vessels, the amount of dust is always below the weight indicated. Sedimentation losses were calculated by a simple flow model and checked by measurements. The agreement was good. The falling height and shape of vessel had hardly any influence. The dependence on the slot width and the grain size was adequately described by the formula. For loss-free sedimentation, the conventional vessel was improved by placing a cylinder over the collection plate to avoid the development of a current bypassing the plate. In numerous comparative measurements with new and conventional sedimentation vessels, it was found that very accurate grain size determinations could be carried out with the improved sedimentation vessel. Quartz dust of various sizes was used for the experiments. The falling height was 20 cm. The sedimentation times ranged from 4000 to 8400 minutes.

25992 **APTIC NO. 47558**

Bunyard, George B. and Bruce A. Raby

MEDICAL APPLICATIONS OF A MOBILE, REAL-TIME, MASS ANALYZER SYSTEM. *Preprint, Uthe Technolo-*

gy International, Sunnyvale, Calif., UTIAP- 050172, 18p., 1972. 11 refs.

A mobile, continuous sampling, real-time monitoring quadrupole mass spectrometer system was built, calibrated, and tested with respect to some interests in medicine. Configurations are described for sampling gases in air, water, and blood. Details are included about the methods of calibration for halothane in air and for halothane, oxygen, and carbon dioxide in water. The analyzer was used to monitor halothane in the atmosphere of surgical suites, in the breath of patients, and surgical personnel after exposure to that anesthetic, and in the skin excretion of patients. It is easily possible to monitor in vivo such substances as oxygen, nitrous oxide, halothane, and carbon dioxide in blood. (Author abstract)

25993 **APTIC NO. 47393**

Cabrol, C., A. Lopez, A. Chapuis, and J. Fontan

A SELF-CONTAINED AUTOMATIC AND PORTABLE APPARATUS FOR THE COUNTING OF PARTICLES. *Aerosol Sci., 3(4):281-287, July 1972. 13 refs.*

The principle of operation, design, calibration, and application of new form of the Aitken nucleus counter are reviewed. The apparatus was miniaturized and made automatic for in situ measurements. Continuous measurements independent of the external pressure are also possible. The theoretical standardization method is presented. (Author abstract modified)

25994 **APTIC NO. 47491**

Cassidy, J. F., Jr.

A COMPARISON OF DYNAMIC EXHAUST EMISSIONS TESTS: CHASSIS DYNAMOMETER VS. ENGINE DYNAMOMETER. *Preprint, Society of Automotive Engineers, Inc., New York, 26p., 1972. 3 refs. (Presented at the Society of Automotive Engineers, National Automobile Engineering Meeting, Detroit, Mich., May 22-26, 1972, Paper 720455.)*

Exhaust emission tests run on an engine dynamometer and a chassis dynamometer were compared. The worst case average difference between the two mass emission results, obtained over a period of six months, was less than 7%. The elimination of the driver, vehicle, and chassis dynamometer yielded significant improvements in test reproducibility with respect to carbon monoxide and nitrogen oxides. Hydrocarbons and carbon dioxide were also measured. A digital computer was used to control speed and throttle position of the engine dynamometer experiments; no transmission was used. The computer and engine dynamometer duplicated transient effects of transmission, vehicle, and chassis dynamometer. (Author abstract modified)

25995 **APTIC NO. 47493**

Cassidy, J. F., Jr. and J. H. Rillings

TRANSIENT ENGINE TESTING BY COMPUTER CONTROL. *Preprint, Society of Automotive Engineers, Inc., New York, 40p., 1972. 17 refs. (Presented at the Society of Automotive Engineers National Automobile Engineering Meeting, Detroit, Mich., May 22-26, 1972, Paper 720454.)*

A computer-controlled engine test cell which combines the advantages of the controlled experimental conditions of the test cell with the dynamic capabilities of a vehicle driven on the road or on a chassis dynamometer was developed. The overall system consists of an IBM 1800 process control computer linked to an electric dynamometer and engine in a test cell. The design criteria are examined for the system, test cell controls, data acquisition instrumentation, and the pallet system which permits prebuilding of the experimental packages for rapid installation in the test cell. An overview of the computer programs, with emphasis on user interaction, is presented. The throttle and speed control algorithms, which apply road or chassis dynamometer load conditions to the engine in the cell, are discussed. Typical torque, speed, and exhaust emission results for a 1970 California cycle tested in the cell are reviewed. (Author abstract modified)

25996 **APTIC NO. 47439**

Chaplin, Anton and Donald P. Meffert

SOURCE SAMPLING--THE CEMENT PLANTS GEIGER COUNTER. *Rock Prod., 75(8):83-84, 86-88, 96-98, Aug. 1972. 7 refs.*

Source sampling is an important factor in formulating and enforcing standards, although source sampling may also be conducted to determine the economic impact of material losses from a source, and to evaluate process efficiency. The objective in making a test of any existing or potential source of pollutants is to get an accurate determination of the types, concentrations, and emission rates of materials being released. A program for determining the gaseous or particulate levels from a source involves six basic steps, varying in complexity with the particular study: planning, preliminary evaluation, stack sampling test, sample analysis, calculations, and report preparation. Each step is discussed. Planning involves determination of a sampling site, while the preliminary evaluation consists of the following measurements: gas flow rate, moisture content, temperature, gas density, filter size, and scaffolding. Particulate sampling is discussed in detail.

25997 **APTIC NO. 47627**

Euguchi, Tadashi

METHODS AND TOOLS FOR MEASURING NITROGEN OXIDES. *(Chisso sankabutsu no sokutei-ho to kiki). Text in Japanese. PPM (Japan), 3(11):33-40, Nov. 1972. 7 refs.*

The standard method used in Japan for measuring nitrogen oxides in the atmosphere in the Saltzman colorimetry method used continuously, handling data for one hour as a unit. Its principles are chemically explained, and flowcharts, diagrams, and illustrations are given. An automatic recorder using this method has capacities in the O to O.2, O to O.5, or O. to 1 ppm ranges. The absorption efficiency of nitrogen dioxide is generally more than 95%, and nitric oxidation ratio is 70 to 80%. Sampling air speed is usually 100 to 500 ml/min; the contact ratio for the air and coloring reagent is 1000 to 1. The method of preparing reagent and operation procedures are explained. As a standard method for measuring NO2 in the United States, the Jacobs-Hochheiser method of 24-hour sampling is explained with a diagram. For measuring NOx at the emission source, the PDS (phenol disulphone acid), the NEDA, and chemiluminescence methods are chemically explained. The nondispersive infrared gas analyzer, the nondispersive ultraviolet gas analyzer, and the oxidation reduction method are explained with diagrams.

25998 **APTIC NO. 47455**

Fuhrmann, Hans

ANALYTICAL CONTROL OF INDUSTRIAL FACILITIES AND THERMAL POWER PLANTS BY MEANS OF AUTOMATIC MEASURING INSTRUMENTS. *(Den analytiske kontrol med industrianlaeg og termiske elvaerker ved hjaelp af automatiske maleinstrumenter). Text in Danish. Elektroteknikeren, 68(4):76-82, Feb. 22, 1972.*

Automatic analytical instruments for chemical industries and thermal power plants are described. The Uvameter, designed for liquid and gas sample analysis in the chemical industry, is suitable for the measurement of high to very low concentrations of nitrogen dioxide, chlorine, ozone, sulfur dioxide, mercury, acetone, benzene, phenol, toluene, xylene, and ethylene oxide. Another instrument, the Imcometer, was designed for the measurement of 30-minute-means of power plant-generated pollutants such as SO2 at a sampling rate of about 20 l/hr.

25999 ***APTIC NO. 47603***

Gushchin, G. P.

INTERNATIONAL OZONOMETRIC DEVICE COMPARISONS PERFORMED IN SIOFOK (HUNGARY). (Mezhdunarodnyye sravneniya ozonometricheskikh priborov v Shiofoke (Vengriya)). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 279:128-137, 1972. 5 refs.

Various ozonometric instruments (Dobson 64, 71, 74, 84, and 110 models, M-83 type ozonometers Nos. 22, 45, 51, and 60, as well as an ISP-22 type spectrograph) from Hungary, East Germany, Rumania, the USSR, Czechoslovakia, Poland, and Jugoslavia were compared by synchronous measurements of the total ozone against a reference standard (Dobson 84 model) in Siofok, Hungary, in May 1969. The daily mean values obtained by Dobson spectrophotometers for different, identical, or dual pairs of wavelengths showed deviations of 20% or more. Dobson spectrophotometers model 84, 74, and 64 delivered ozone values about 10% lower than models 71 and 110. The differences between the readings of M-83 instruments and of Dobson spectrophotometer model 84 were 13% and 20%, maximum, with and without aerosol adjustment, respectively. The observations stress the need for improved and frequent calibration of Dobson instruments.

26000 **APTIC NO. 47628**

Herbolsheimer Ralf, Leo Funk, and Heinz Drasche

THE ADEQUACY OF ACTIVATED COAL AS AN ADSORBENT FOR THE DETERMINATION OF TRICHLOROETHYLENE IN AIR. *(Ueber die Verwendbarkeit von Aktivkohle als Adsorptionsmittel zur Bestimmung von Trichloraethylen in der Luft). Text in German Staub, Reinhaltung Luft, 32(10):407-409, Oct. 1972. 5 refs.*

For determination of trichloroethylene in working places and in atmospheric air, adsorption tubes filled with activated coal were used. The activated coal has been activated prior to the measurements for 60 min at 200 C. The tubes had a diameter of 0.5 cm. They were filled with 500 mg activated coal forming a layer of 7 cm. The retention time of activated coal was dependent on the relative humidity. But even at 100% humidity, air samples with a concentration of 810 mg/cu m could be drawn through the tube for 2 hr without trichloroethylene losses by incomplete adsorption. The retention was less influenced by the concentration than by the throughput (ml/min). A battery operated membrane pump was used for the experiments. Desorption was performed by n-decan. Reproducibility of the initial concentration was 95 to 100%.0

26001 **APTIC NO. 47342**

Imagami, Kazushige

MEASUREMENT METHODS FOR SUSPENDED PARTICULATES. (1). *(Fuyu ryushijo busshitsu no sokuteino ni tsuite (1). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 7(5):224-236, Sept. 1972.*

The environmental standard for suspended particulates and the measuring methods are discussed. Instructions for sampling methods using the Japanese Industrial Standard sampler are given. The sampling location must be 3 to 10 m above the ground, where a representative condition of the area s air pollution can be expressed. Both low volume and high volume air samplers use measurements of the concentration by weight. The principles common to the both methods are discussed with mathematical analyses. The measurement of the flow quantity, the scale, sampling time, and some points for accurate measurement and maintenance of the the apparatus are given.

26002 **APTIC NO. 47329**

Inabu, Fumio

MEASUREMENT OF AIR POLLUTION BY UTILIZING LASER. *(Reza o oyo shita taiki osen no keisoku). Text in Japanese. Denki Gakkai Zasshi (J. Inst. Elec. Engrs., Japan), 92(8):810-813, Aug. 1972. 22 refs.*

Various studies that had been done on the use of lasers for detecting air pollution are reviewed. For the detection of air pollution by laser, the principles of light scattering, resonance, and absorption are used. For laser radar detection by (lidar) for measurement and analysis, the principles of Mie scattering and Raman scattering are used. In addition to the above two methods, which have reached the stage of application to actual use, there is the method of using various resonance effects. Semi-conductor laser, spin-flip Raman laser, and parametric oscillator are discussed.

26003 **APTIC NO. 47400**

Ioffe, B. V., A. G. Vitenberg, and V. N. Borisov

USE OF GAS-LIQUID EQUILIBRIUM FOR DETERMINING MICROADMIXTURES IN THE ATMOSPHERE. *(Ispol zovaniye ravnovesiya gaz-zhidkost dlya opredeleniya mikroprimesey v atmosfere). Text in Russian. Zh. Analit. Khim. (Moscow), 27(9):1811-1816, 1972. 6 refs.*

A new method for the determination of admixtures in gases, based on the saturation of a small volume of liquid by a gas to be analyzed until equilibrium between the gaseous and liquid phases is reached, is suggested. The method has the advantages of a selective increase of the sensitivity and of the elimination of the need for measuring accurately the amount of the absorbing liquid and of the gas volume sampled. The method was tested by determining aromatic hydrocarbons and simple ketones in concentrations at the maximum allowable level. Acetic acid for benzene, toluene, and m-xylene, and water for ketones were used as solvents. The error of the gas chromatographic determination was less than 10% at a sensitivity of O.05 mg/cu m.

26004 **APTIC NO. 47694**

Jeltes, R. and E. Burghardt

AUTOMATIC GC-MONITORING OF C1-C5 HYDROCARBONS. *(Automatische GC-meting met een C1-C5 monitor). Text in Dutch. Chem. Weekblad, 68(32/33):16-19, Aug. 1972. 44 refs.*

An automatic, solid gas chromatograph for the monitoring and concentration determination of C1-C5 hydrocarbons in the atmosphere is described. The instrument is able to determine the hydrocarbons as a total or separately, and to detect about 65% of the total exhaust hydrocarbons. The samples taken by means of Automatic Sequential Air Sampler are directly analyzed after adsorption on alumina, and the signals delivered by a flame ionization detector are sent to a recorder. The sensitivity for C1-C3 and C4-C5 hydrocarbons lies in the respective ranges of 2-5 ppb and 7-20 ppb, with a standard deviation of 1.7-3.5% for 0.01 ppm concentration of a single component.

26005 **APTIC NO. 47706**

Kawase, Zenichi

MEASUREMENT METHODS FOR PARTICULATES FROM INCINERATOR. NO. 1. *(Gomi shokyakuro no baijin no sokutei hoho n i tsuite, sono 1). Text in Japanese. Toshi to Haikibutsu (J. Solid Waste), 2(7):33-44, Oct. 1972.*

Methods of measuring dust concentration in flue gas, its speed, water content, composition, and sampling are discussed. Methods of analysis of the toxic matter in flue gas dusts, the sampling methods, measuring locations and methods, and cadmium and lead analysis methods are discussed. The concentration of flue gas is measured by Ringelmann s chart or Roberts chart. An optical soot measuring meter using an air or steam injector, a light source, and a thermocouple, a continuous weight concentration soot meter, a telescopic soot meter, a gas flow velocity meter using a pitot tube and an inclined manometer, a water content measuring apparatus, an Alzatt gas analyzer, a soot measuring apparatus with a dust tube, and a humidity gas meter are explained with illustrations. Samples of flow speed measurements, water content measurements, and soot quantity measurements are presented in tables. The quantity of soot in flue gas is expressed by converting it to the weight of 1 cu m of dry flue soot under standard conditions (temperature 0 C, pressure 760 mm Hg), and is calculated by the formula W equals m divided by V. W is dry flue soot quantity (g/N cu m), m is the quantity of captured soot (g), and V is the quantity of dry flue gas absorbed under the standard condition (N cu m).

26006 **APTIC NO. 47659**

Kobayashi, Takao and Humio Inaba

SPECTROSCOPIC ANALYSIS OF AIR POLLUTION WITH LASER RADAR TECHNIQUES. *(Reza reda ni yoru taiki osen no bunko bunseki). Text in Japanese. Bunko Kenkyu (Res. Spectroscop.), 21(5):295- 315, Oct. 1972. 54 refs.*

A review is given on the classification and comparison of basic analytical methods of air pollution with laser radar techniques. The optical interaction processes that are applicable to laser remote sensing methods are Mie scattering, Rayleigh scattering, Raman scattering, fluorescence, and absorption. Mie scattering is suitable for the detection of solid or liquid particulates such as aerosols. The cross-section area of Rayleigh scattering is small compared to that of Mie scattering. However, this can be improved by the resonance effect of the inherent transition state of the detected material. Raman scattering is primarily based on the inherent vibration-rotation of a molecule or the change of the electronic condition of the atom; the analyses are easier compared to Rayleigh scattering. The cross-section area is small so that it is necessary to improve the detection sensitivity. Emission (fluorescence) and absorption are both based on the primary reaction between the radiation light and the material; the consistent wavelength for laser light and resonance are required.

26007 **APTIC NO. 47657**

Korten, M. P. H.

AIR POLLUTION MEASUREMENT METHODS. *(Meetmethodes voor de luchtverontrieniging). Text in Dutch. Chem. Weekblad, 68(38):L19- L20, Sept. 1972.*

Conductometric, chemiluminescent, coulometric, and colorimetric 0methods for the determination of sulfur dioxide, nitrogen dioxide, nitric oxide, and ozone in the atmosphere are reviewed. Conductometry is used for the determination of SO2 concentrations, while the chemiluminescent method using organic reagent constitutes a highly specific technique for the determination of ozone. The use of this method is, however, limited by inherent problems of the photomultiplier required for the determination. The coulometric method is a relatively low specificity, and the interference of components other than that to be determined creates problems. The simple and reliable colorimetric method is extensively used for the determination of SO2, No, NO2, ozone, and chlorine. The dilution of NO, NO2, and SO2 gases to be used for calibration is done best by means of the gas diffusion method using dried and purified air for dilution.

26008 **APTIC NO. 47391**

Lee, R. E., Jr., J. S. Caldwell, and G. B. Morgan

THE EVALUATION OF METHODS FOR MEASURING SUSPENDED PARTICULATES IN AIR. *Atmos. Environ., 6(9):593-622, Sept. 1972. 18 refs. (Presented at the American Chemical Society, National Meeting, Washington, D. C., Sept. 1971.)*

Based on an in-depth comparative study, the relationships among commonly used methods for measuring suspended particulate matter were defined. High volume air samplers, British smoke shade measuring devices, membrane filter samplers, tape samplers, and cascade impactor samplers were operated for 24-hour sampling periods at 11 sites in Great Britain. Data derived from gravimetric and optical analysis of the samples were used to develop regression equations and other relationships. Smoke shade measurements generally were lower than the corresponding hi-vol measurements when concentrations of suspended particulate matter were low. In contrast, black staining particulate matter resulted in smoke shade values higher than corresponding values obtained gravimetrically. The soiling index correlated poorly with gravimetric measurements of suspended particulates. Size distributions and other parameters are discussed. (Author abstract modified)

26009 **APTIC NO. 47480**

McKee, Herbert C. and Ralph E. Childers

COLLABORATIVE STUDY OF REFERENCE METHOD FOR THE CONTINUOUS MEASUREMENT OF CARBON MONOXIDE IN THE ATMOSPHERE (NON-DISPERSIVE INFRARED SPECTROMETRY). *Southwest Research Inst., Houston, Tex., Environmental Protection Agency Contract CPA 70-40,SwRI Proj. 01-2811, EPA-R4-72-009, 46p., May 1972. 14 refs.*

NTIS: PB 211265

Non-dispersive infrared spectrometry was tested as the reference method for the continuous measurement of carbon monoxide in the atmosphere. The checking limit for duplicates was established at 0.5 mg/cu m; repeatability was 1.6 mg/cu m. Reproducibility varied nonlinearly with concentration with a minimum of 2.3 mg/cu m at a concentration of 20 mg/cu m and ranged to 4.3 mg/cu m in the concentration range of 0-60 mg/cu m. The minimum detectable sensitivity was 0.3 mg/cu m. The compensation for water vapor interference was satisfactory for drying agents and refrigeration methods. The use of narrow-bank optical filters alone might not provide adequate compensation. The accuracy was totally dependent on the availability of dependable calibration standards. Calibration and sampling procedures were also examined. (Author summary modified)

26010 **APTIC NO. 47308**

Obert, Jean Claude

AIR POLLUTION. DETECTION OF STRONG ACIDS. COMMENTS ON CONTINUOUS AUTOMATED ANALYSIS PERFORMED ACCORDING TO THE NF X 43-005 STANDARD METHOD. *(Pollution atmospherique. Detection des acides forts. Observations relatives a l analyse automatique continue effectuee selon la norme NF X 43-005). Text in French. Colloq. Int. Homme, Air Eau, Paris, France, 1972, 18p. (June.)*

An instrument for the continuous, automated analysis of atmospheric sulfur dioxide according to the NF X 43-005 standard (continuous 15-minute sampling) is described. The air sample is filtered, and then bubbled through oxygenated water adjusted to a pH value of 4.5. The acidified absorbing solution is neutralized by means of sodium borate dosaged by peristaltic pump. The SO2 concentration is determined from the known sample volume and the pH shift caused by the absorbed SO2. Sodium borate, water, and air deficits trigger optical alarms, and signals are transmitted to an evaluation center.

26011 **APTIC NO. 47394**

Oeseburg, F.

THE INFLUENCE OF THE APERTURE OF THE OPTICAL SYSTEM OF AEROSOL PARTICLE COUNTERS ON THE RESPONSE CURVE. *Aerosol Sci., 3(4):307-311, July 1972. 4 refs.*

The influence of the aperture of the collecting cone of the optical system of aerosol particle counters on the response curve was examined by calculating this curve for a sphere with a relative refractive index of 1.491 and size parameters between 0.1 and 30. Optimum response curves were obtained in optical systems in which the radiation scattered at 20-120 deg was collected. (Author abstract modified)

26012 **APTIC NO. 47612**

Ohira, Toshio and Mitsuru Udagawa

MONITORING AND DATA PROCESSING OF AIR POLLUTION. *(Taiki osen no sokutei to deta shori). Text in Japanese. Bunseki Kiki (Analysis Instr.), 10(12):37-44, Dec. 1972. 10 refs.*

Although statistical data processing provides some information on the actual pollution situation and mechanisms, it does not provide a complete explanation of the mechanisms or a future forecast. Diffusion models, statistical processing, and multiple analyses can be used in air pollution studies. No dependable calculation method for the estimation of carbon monoxide near roads has been developed. Theoretical oxidant concentration forecasts alone cannot be used to examine photochemical smog. Information is incomplete on sources, fuels used, equipment used, emissions, fluctuations in industrial activities, emission factors of each source, and pollution in the upper atmosphere. An example of the statistical method is given.

26013 **APTIC NO. 47423**

Preining, O.

INFORMATION THEORY APPLIED TO THE ACQUISITION OF SIZE DISTRIBUTIONS. *Aerosol Sci., 3(4):289-296, July 1972. 24 refs. (Presented at the American Physical Society Meeting, Washington, D. C., April 24-29, 1972.)*

The size distribution of an aerosol, a probability density, is a very descriptive parameter of any aerosol. The informational entropy, associated with one experimentally determined size distribution, is not only dependent on the size distribution itself but also on the instrument used, especially on its resolution and accuracy. An extension of the concept of informational entropy was introduced to allow for the fact that the size distribution is only known within an accuracy inherent to the instrument and described by a conditional probability density. The concept of informational entropy was used to compare quantitatively optical particle counters, aerosol centrifuges, and cascade impactors. (Author abstract modified)

26014 **APTIC NO. 47406**

Pries, C.

ANALYSIS OF COPPER AND OTHER METALS IN THE ENVIRONMENT. *(Analyse van koper en andere metalen in het milieu). Text in Dutch. TNO-Nieuws, 27(9):451-452, Sept. 1972.*

Uses of emission spectrometry, atomic absorption, activation analysis, and classical automated techniques for the analysis of copper and other metals in the environment are reviewed. Activation analysis is suitable for the nondestructive analysis to a minimum concentration of 0.1 ppm, but lower concentrations require preliminary destruction and separation. This technique is also suitable for the detection of mercury, arsenic, antimony, and selenium. The atomic absorption technique constitutes a rapid method ready for automation. Classical automated methods have increased precision and reproducibility. Emission spectrometry is usually not satisfactory regarding accuracy and sensitivity and may require preliminary concentrations, especially for the analysis of biological materials. The minimum concentrations of copper detectable by atomic absorption, activation analysis, and emission spectrometry are 40, 5, and 1 microgram/kg. the respective values are 11, 10, and 700 microgram/kg for cadmium, 800, 0.5, and 700 microgram/kg for arsenic and 10, 0.5, and 100 for zinc. The detectability of lead by atomic absorption and emission spectrometry is 120 and 30 micrograms/kg. The smallest quantities of mercury that can be determined by atomic absorption and activation analysis are 1 and 0.5 micrograms/kg, respectively.

26015 **APTIC NO. 47381**

Salzano, F. J. and L. Newman

SULFUR TRIOXIDE, OXYGEN, PLATINUM ELECTRODE IN A FUSED SULFATE. *J. Electrochem. Soc., 1972:1273-1278, Oct. 1972. 8 refs.*

The behavior of the oxygen, sulfur trioxide, platinum/(sodium, lithium, potassium)2 sulfate electrode was studied at SO3 concentrations in the ppm range. The cell consists of two similar electrodes isolated from each other by a solid cation permeable membrane. One electrode is a reference electrode through which passes an air or oxygen stream containing a fixed and known concentration of sulfur dioxide. Through the other electrode is passed a similar gas stream containing a variable concentration of SO2. The SO2 passes into each electrode through a platinum inlet tube which converts a fraction of the SO2 in the gas stream to SO3. The emf versus concentration behavior of this cell was studied and exhibited Nernstian behavior. This work shows that the cell has possibile applications in continuous monitoring of the ambient air for both SO2 and SO3, i.e., sulfuric acid aerosols. (Author abstract)

26016 **APTIC NO. 47369**

Schubert, Rudolf

A THERMAL ANALYSIS-MASS SPECTROMETRIC TECHNIQUE FOR IDENTIFYING TRACE IMPURITIES IN GAS SAMPLES. *Anal. Chem., 44(12):2084-2087, Oct. 1972. 9 refs.*

A freeze-out thermal analysis-mass spectrometric technique was developed for the determination of unknown pollutants in gas streams. Freeze-out was performed at the time of analysis rather than at the collection point, thus reducing the possibilities of chemical reactions during the time interval between collection and analysis. By recording both an unconcentrated and concentrated sample mass spectrum, sensitivities on the order of 10 ppb were achieved. Separation of 2-carbon and higher hydrocarbons, as well as various halogenated compounds, by the technique was achieved. Relative vapor pressure data aided identification of the compounds. Complete identification of impurity quantities was by mass spectrometry. The separation of mass spectra by sample temperature eliminated difficulties of interpretation due to overlapping spectra.

26017 **APTIC NO. 47310**

Veer, S. M. de

AIR POLLUTION MONITORING IN THE NETHERLANDS. *Colloq. Int. Homme, Air Eau, Paris, France, 1972, 16p. (June.)*

The Dutch monitoring network is described. A continuous coulometric titration measurement method is used for determination of sulfur dioxide. In the Rijnmond warning system SO2 is used as the detecting pollutant. The hourly mean concentrations are reduced to be independent of site, time, and wind direction and are geographically averaged for use as a meteorologic parameter to unfavorable weather conditions. The computer and computer program used for evaluating SO2, wind, stability, and hourly, diurnal, and seasonal data are described. A continuous coulometric titration monitor was developed to measure SO2, ozone, nitric oxide, nitrogen dioxide, and carbon monoxide.

26018 **APTIC NO. 47408**

Vogelsgesang, Roland

GRANULAR SIZE DETERMINATION BY MEANS OF IMAGE ANALYSIS DEVICES. *(Korngroessenbestimmung mit automatischen Bildanalysengeraeten). Text in German. Staub, Reinhaltung Luft, 32(9):368-372, Sept. 1972. 25 refs.*

A video system for particle size determination, composed of a microscope, television camera, television tube, video detector, monitor, computer, and display unit such as typewriter or punched tape, is described. The photosensitive layer in the television tube is scanned by an electron beam, and the video signals are fed across the detector to a computer for the determination of the count, length, and average height and area of the dust particles by means of pulse comparison. The results may be falsified by intensity changes and agglomeration of the particles, as well as by the low depth of focus of the microscope, to the effect that a dust appears to be coarser than it really is. The errors can be largely avoided by producing shadow images by the evaporation technique, which requires more preparatory work, while the measuring operation itself is considerable simplified.

26019 **APTIC NO. 47518**

Wyatt, Philip J. and David T. Phillips

A NEW INSTRUMENT FOR THE STUDY OF INDIVIDUAL AEROSOL PARTICLES. *J. Colloid Interface Sci., 39(1):125-135, April 1972. 14 refs.*

While the importance of light scattering for the study of small particles has long been recognized, it only recently has become possible to measure the light scattering characteristics of individual microparticles in their natural state. The Differential II light-scattering photometer is described, as well as the applications of the single particle measurements that are possible using this instrument. Individual particles of diameters ranging from 100-5000 nm are introduced into a chamber where they are suspended and automatically held stationary in a laser beam by means of time-varying electrostatic fields. A rotating photomultiplier detector system measures the intensity of light scattered by the levitated particle as a function of scattering angle. The atmosphere within the chamber may be controlled and changes in the levitated aerosol particle may be studied over periods of many hours. In addition to smog-like aerosol particles, the Differential II was used to study the physical properties of polystyrene latex spheres, viable and dead bacteria, and spores. Operation of the instrument is briefly described and selected measurements performed with the instrument are presented. (Author abstract modified)

26020 **APTIC NO. 47607**

Yamada, G.

ANALYZING METHODS OF NOX IN FLUE GAS. *(Nensho haigasu chu no chisso sankabutsu (NOx) no bunseki). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 24(11):2-7, Nov. 1972. 7 refs.*

A revised Japanese standard for sampling and analyzing nitrogen oxides in flue gases will soon be made public. Gas trapping, naphthylethylenediamine analysis, and phenoldisulfonic acid analysis are described. Under the present standard, a 2-hour air oxidation of nitric oxide is required; however, this is insufficient. If oxygen is used instead of air, more than 95% oxidation can be obtained in 2 hours. Under the naphthylethylenediamine method, the formation coefficient of nitrogen dioxide varies, depending on the concentration of NOx and NO/NO2, so that the result should be checked with the phenoldisulfonic acid method to arrive at an accurate figure. The phenoldisulfonic acid method can be applied in a wider range of NOx concentrations, suffers less interference from coexisting gases, is reproducible, and is a standard method outside Japan. The concentration of hydrogen peroxide should be changed from the 0.03% to 0.3%. Oxidation and absorption time should be more than 16 hours. With the addition of O2 it is possible to shorten the oxidation period to 1/5th. By using ozone and heavy chromate, NO oxidation can be shortened, even when the NO concentration is small. An electrode sensor can be used to estimate nitrates rapidly and thus shorten the analysis time. Using these methods combined, it would be possible to finish the analysis in 2-3 hours.

26021 **APTIC NO. 47637**

Yamate, N.

MODERN ASPECTS OF AIR POLLUTIONS MONITORING. *(Taiki osen renzoku sokuteiho no saikin no doko). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(5):21-25, Oct. 1972. 9 refs.*

Due to the progress made in analyzing equipment and electronics, air pollution monitoring by telemeter systems has spread widely, contributing to the prevention of air pollution. A new monitoring method of Nitrogen oxides is the chemiluminescent method. For sulfur dioxide, a flame photometric detector was devised which enables the continuous monitoring of sulfur oxides, with a high degree of sensitivity and selectivity. For continuous monitoring of hydrocarbons, the flame ionization detector (FID) can be used. Chemiluminescence can also be used for ozone. For measurement of carbon monoxide, the detector tube method and non-dispersive infrared spectrometry (NDIR) are widely used. A device using FID has been developed recently for continuous measurement of carbon monoxide, which has higher precision rate than the NDIR method. Studies are being made on the use of the Raman effect and laser.

26022 **APTIC NO. 47720**

Ziekman, P.

PARTICLE HOLOGRAPHY. *(Deeltjesholografie). Text in Dutch. Elektrotech. Elektron., 27(21):682-688, Oct. 11, 1972. 9 refs.*

Use of a ruby impulse laser with short exposure times permits ultrarapid holographs to be made of rapidly moving cloud particles. Reconstruction produces a three-dimensional image of the particle cloud. In this way, particle analysis can be carried out on an undisturbed sample without sampling being necessary, covering particle sizes of a few microns and larger.

1971

26023 **APTIC NO. 47502**

Environmental Measurements, Inc., San Francisco, Calif.

SO2 AND NO2 MEASUREMENTS. SOUTHERN CALIFORNIA. 18-22 OCTOBER 1971. *Environmental Protection Agency Contract 6H-02-0124, Task A, APTD-1147, 29p., Dec. 1971.*

NTIS: PB 210717

Two correlation spectrometers were used to measure sulfur dioxide and nitrogen dioxide simultaneously in the general vicinity of an oil refinery in southern California. Results were comparable within 2%. Simultaneous wet-chemical, in-stack SO2 concentration measurements resulted in hour-long comparable data which were 70% of the remote sensor values. Long-line spatial-integrated monitoring was conducted along one boundary of an oil refinery, and day and night variations in SO2 and NO2 were measured along a 1235-meter path. The system sensitivity was on the order of 5 ppb for both gases. Regional total burden surveys were used to compute mass flow maps in the area. Plumes were distinct from each major source, but the data were generally uniform over the 10-mile distance. (Author conclusions modified)

26024 **APTIC NO. 47787**

Society of Automotive Engineers, Inc., New York

PROCEDURE FOR THE CONTINUOUS SAMPLING AND MEASUREMENT OF GASEOUS EMISSIONS FROM AIRCRAFT TURBINE ENGINES. *Aerospace Recommended Practice 1256, 16p., Oct. 1, 1971.*

The recommended procedure for the continuous sampling and analysis of gaseous emissions from aircraft gas turbine engines is presented. It is intended to standardize the emission test procedures and equipment for measuring carbon monoxide, carbon dioxide, nitric oxide, nitrogen dioxide, and total hydrocarbon. Terms are defined, and equipment and instrument routines are indicated. Reference gases, instrument layout, test procedures, and sampling are outlined. Nondispersive infrared analyzers are used for the continuous monitoring of CO, CO2, and NO in turbine exhaust; nondispersive ultraviolet analyzers are used for NO2 measurement. (Author abstract modified)

26025 **APTIC NO. 47550**

Barth, C. L. and L. B. Polkowski

IDENTIFYING ODOROUS COMPONENTS OF STORED DAIRY MANURE. *Preprint, American Society of Agricultural Engineers, St. Joseph, Mich., 27p., 1971. 27 refs. (Presented at the American Society of Agricultural Engineers, Winter Meeting, Chicago, Ill., Dec. 7-10, 1971.)*

Volatile and liquid odorous components produced in stored liquid dairy manure were identified. The oxidation-reduction potential of the waste samples was measured with a pH meter and the dissolved oxygen levels were measured with a precision lead anode-silver cathode oxygen probe connected to a potentiometric recorder. Steam distillation was effective in the analysis of ammonia and total volatile organic acid components and can be useful in separating volatile compounds for further chromatographic analysis. Paper chromatography was a practical tool in the identification of the odorous compounds, and the procedures of Buswell and Boring and of Blau were particularly useful in identifying volatile organic acids and amines, respectively. Odorous components identified in conjunction with stored dairy manure were acetic, propionic, butyric, and valeric acids; methyl-, dimethyl-, ethyl-, and diethylamine; ammonia, hydrogen sulfide, mercaptans, and disulfides. (Author conclusions modified)

26026 **APTIC NO. 47453**

Clem, R. G., G. Litton, and L. D. Ornelas

A ROTATED CELL FOR ANODIC STRIPPING ANALYSIS: COMPUTER RESOLUTION OF PEAK(S) AND BACKGROUND DATA. *In: Nuclear Chemistry. Annual Report. 1971. California Univ., Lawrence Berkeley Lab., UC-4 Chemistry, TID-4500 (59th Ed.), p. 347-348, 1971. 1 ref.*

NTIS: LBL-666

Anodic stripping voltammetry can be used to determine trace elements in water, water extracts of air, aqueous soil leachings, and possibly biologic fluids. An improved rotated cell is described with very rapid sparging characteristics which reduce the time required for purging the sample of electroreducible oxygen. Digital signal recording allows one to first obtain the whole voltammogram on the first run, then electronically expand or compress the data at will after the fact to observe all the peaks of interest. The raw experimental data are initially stored on magnetic tape prior to its processing to obtain a clean spectrum, and are then stored in a library. The peaks are analyzed numerically by computer.

26027 **APTIC NO. 47377**

Dielesen, F.

CO MEASUREMENTS IN PRACTICE. *(CO-metingen in de praktijk). Text in Dutch. Gaswijs, 4(4):5-7, July-Aug. 1971.*

A Draeger type portable carbon monoxide indicator with a sampler, suitable for routine determination of CO with satisfactory precision, is described. The sample to be analyzed, 100 cu cm/ pump stroke, is sucked in through an indicator tube by previously compressing bellows which are fitted with compression springs. The presence of CO in the gas sample is indicated by the color change of the reagent in the detector tube, and the concentration is proportional to the length of tube showing color change. Five different indicator tubes with the respective measuring ranges of 5-700 ppm, 10-3000 ppm, 1000-12,000 ppm, 3000-40,000 ppm, and 5000-70,000 ppm are available. Each tube is provided with graduating scales, one for one, and one for 10 pump strokes.

26028 **APTIC NO. 47443**

DiPietro, Joseph

APPARATUS FOR DETERMINING THE COMBUSTIBILITY AND SMOKE DENSITY OF ORGANIC POLYMER MATERIALS. *(Vorrichtung zur Durchfuehrung eines analytischen Tests). Text in German. (Michigan Chemical Corp., St. Louis) W. Ger. Pat. Appl. 2,146,331. 15p., Sept. 16, 1971. 2 refs. (6 claims).*

An apparatus is described for determining the flammability of plastics. It comprises a chamber for measuring oxygen index and a connecting chamber for the optical determination of the density of the combustion smoke.

26029 **APTIC NO. 47450**

Giauque, R. D. and J. M. Jaklevic

RAPID QUANTITATIVE ANALYSIS BY X-RAY SPECTROMETRY. *In: Nuclear Chemistry. Annual Report. 1971. California Univ., Lawrence Berkeley Lab., UC-4 Chemistry, TID-4500 (59th Ed.), p. 342-343, 1971. (Presented at the Denver X-ray Conference, Annual, 20th, Aug. 11-13, 1971.)*

NTIS: LBL-666

An X-ray fluorescence analysis method applicable to fluorescent spectra excited with monoenergetic X-ray was developed. The technique employs one calibration, uses a single-element thin-film standard, and depends upon theoretical cross sections and fluorescence-yield data to interpolate from element to element. The samples are treated as thin films, and corrections for absorption effects are easily determined. Enhancement effects, if not negligible, are minimized by sample dilution techniques. Pottery, plants, blood, and particulate matter collected on an air pollution filter were analyzed for metals by X-rays fluorescence and neutron activation analysis. The calibration method has been successfully applied to trace element analyses in light element matrices. When used in conjunction with low-background detector systems and X-ray tube excitation, it can provide rapid and accurate multielement analyses down to concentrations of less than 1.0 ppm.

26030 **APTIC NO. 47616**

Goroshko, B. B.

CONTRIBUTION TO THE SELECTION OF THE AMOUNT OF SAMPLING SITES, AND FREQUENCY OF AIR POLLUTION MONITORING. *(K voprosu o vybore kolichestva punktov otbora prob a chastote nablyudeniy za zagryazneniyem atmosfery). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 254:140-151, 1971. 23 refs.*

Recommendations concerning the optimum arrangement of sampling stations and sampling time and frequency for urban air pollution monitoring are derived from literature data and experiments. The specific pattern of the emissions in urban areas (concentrated or scattered industrial emission sources and the relation between emissions from high and low sources) and particular topographic conditions call for a flexible arrangement of sampling stations with respect to the location of major emission sources and dominant wind directions. The differences in the concentrations measured at two different sampling stations are due to the location of the sampling station rather than to the distance between them. Distances of 3-4 km between sampling stations, and shorter in topographically diversified urban areas, are regarded as sufficient both for the detection of maximum and minimum pollutant concentrations, and for securing the representativeness of each sampling station. Samplings should be conducted on a round-the-clock basis, with emphasis on the 6 am to 9 pm periods for more detailed observations, assuming that both meteorological factors and pollution rates have maximum variability during daytime periods. Samplings are best conducted at 3-hour intervals according to a sliding schedule, in alternating each day samplings between morning and afternoon periods at each station.

26031 **APTIC NO. 47417**

Inaba, Fumio

MEASUREMENT OF ATMOSPHERIC CONTAMINATION BY A LASER-RADAR METHOD. *(Reiza ni yoru taikiosen no sokutei). Text in Japanese. Oyo Butsuri (Tokyo), 40(11):1261-1267, Oct. 1971. 32 refs.*

Lasers using Mie light scattering can be used to measure aerosols and water droplet-like particles. Lasers can be used to study the temperature of inversion layers, visibility, density of particles, distribution of smog and fog, smoke distribution, and stack height. Raman dispersion can be used in remote analysis of pollution. Laser-Raman radar measurements can be incomplete, however, because the vertical areas measured by Raman dispersion are normally so small. Resonance absorption of laser beams can also be used to measure pollution; its detectibility for sulfur dioxide and nitrogen dioxide is discussed. An automobile has been manufactured in Japan which carries a laser-Raman radar system to measure smoke and other pollutants.

26032 **APTIC NO. 47451**

Landis, D. A., F. S. Goulding, and B. V. Jarrett

SOME ASPECTS OF X-RAY FLUORESCENCE SPECTROMETERS FOR TRACE-ELEMENT ANALYSIS. *In: Nuclear Chemistry. Annual Report. 1971. California Univ., Lawrence Berkeley Lab., UC-4 Chemistry, TID-4500 (59th Ed.), p. 337-340, 1971. 5 refs.*

NTIS: LBL-666

The development of the title method is discussed. Low-noise field- effect transistors were used to improve the spectrometers. Semiconductor detector spectrometers were used as X-ray fluorescence analyzers for elements above zinc in the periodic table. Other improvements which eliminated noise reduced the energy resolution of X-ray spectrometers to 100 eV or less, making possible the separation of all elements above carbon in the periodic table. The effect of counting rate on the resolution on manganese X-rays for different Gaussian peaking times and the method of correcting for dead time are discussed. As an example of the performance of X-ray spectrometers, the spectrum of an air pollution particulate filter was obtained using a guard ring reject detector and pulsed light-feedback electronics.

26033 **APTIC NO. 47784**

Schwiesow, R. L.

REMOTE SENSING OF POLLUTANTS. (ANNUAL REPORT). *National Oceanic and Atmospheric Administration, Boulder, Colo., Environmental Research Labs., Office of Air Programs Grant, Rept. APTD-0891, 51p., June 30, 1971. 2 refs.*

NTIS: PB 206734

Quantitative infrared spectra and Raman-lidar scattering cross sections were obtained of pollutant gases such as carbon monoxide, ozone, hydrogen chloride, sulfur dioxide, ammonia, and nitric acid. Information was obtained on analyzing long path infrared spectra by digital means for atmospheric gas concentrations, as well as on scattering cross section measurements for sulfur dioxide and nitric oxide. An extensive literature file on the spectra of natural and pollutant gases is maintained, and technical advice on spectroscopic problems is provided. The developed information is crucial for proper interpretation of remote sensing field measurements of pollutant concentrations in both source and ambient situations. (Author abstract modified)

1970

26034 **APTIC NO. 47470**

Houseman, John and F. William Hafner

COMPUTER-CONTROLLED OPERATING AND DATA HANDLING SYSTEM FOR A QUADRUPOLE MASS SPECTROMETER. *California Inst. of Tech., Pasadena, Jet Propulsion Lab., National Aeronautics and Space Administration Contract NAS 7-100, NASA-TB-71-10191, JPL Invention Rept. 30-1625/NPO-11427, 22p., 1970 (?). 3 refs.*

A quadrupole mass spectrometer system, interfaced with a digital computer, is discussed which has greatly simplified the data acquisition and data reduction process. The system carries out on-line chemical analysis of the combustion gases (hydrazine, nitrogen dioxide, nitric oxide, and carbon monoxide) in a rocket chamber during 5-second test firing. The system is also applicable to the field of air pollution control. The computer controlled mode of operation is based on supplying the quadrupole control console with an externally generated control voltage to tune the instrument to the mass numbers that are of interest. Since each peak occurs at its own specific ramp voltage, these peak voltages for selected mass numbers can be supplied to the ramp voltage terminals, and the output of the quadrupole will then consist of only the peak heights for the selected known mass numbers. The operation sequence consists of a single calibration followed by a series of test runs. In the calibration run a small PDP-4 computer is used to find the peak voltages for all 50 mass numbers. The peak voltages for the selected mass numbers are then typed into memory, and the computer supplies the ramp voltage terminals with these values, using a 10-V dc reference supply and a digital to analog conveter. The peak voltages drift with time, and it is necessary to supply nine slightly different values around the calibrated value for each mass number to ensure that the peak is not missed. The quadrupole output is recorded on digital tape and subsequently processed by an IBM 7094 computer to yield the relative concentrations of the desired components. (Author abstract modified)

26035 **APTIC NO. 47526**

Jervis, R. E., D. Debrun, J.-L. Debrun, W. LePage, and B. Tiefenbach

STUDIES OF TRACE HEAVY METAL POLLUTANTS BY ACTIVATION ANALYSIS. *Preprint, 24p., 1970. 18 refs. (Presented at the Canadian Chemical Engineering Conference, 20th, Sarnia, Ontario, Oct. 19-21, 1970.)*

The radioactivation analysis technque was applied to the determination of heavy metals in a wide variety of inorganic and biological environmental samples. The neuclear method detected nanogram to microgram quantities of several toxic materials, e.g., arsenic, selenium, cadmium, mercury, iron, and thorium, in foods, fish, hair, and the human body. A novel on-stream activation method for continuous monitoring of trace metals in effluents, with possible application to airborne particulate analysis, is also outlined. (Author abstract modified)

26036 **APTIC NO. 47538**

Vestal, Marvin L., Allan G. Day, III, William H. Johnston, C. E. Waring, F. W. Lampe, Gordon J. Ferugsson, J. H. Futrell, Austin Wahrhaftig, M. S. B. Munson, William F. Biller, Edward Kraftel, and Melvin Vanik

IMPROVED INSTRUMENTATION FOR DETERMINATION OF EXHAUST GAS OXYGENATE CONTENT. *Scientific Research Instruments Corp., Baltimore, Md., National Air Pollution Control Administration and Coordinating Research Council Contracts CPA 22-69-40 and CAPE 11-68, Rept. SRIC 70-6, APTD-1308, 60p., March 1970. 41 refs.*

NTIS: PB 200268

Chemical ionization mass spectrometry was used for the analysis of trace oxygenates in exhaust emission with a sensitivity range of 1 ppb to 10,000 ppm. Prototype design, analytical procedure, calibration, and test results are reviewed. The technique was successfully applied to the determination of formaldehyde, acetaldehyde, acrolein, propionaldehyde, acetone, crotonaldehyde, butyraldehyde, 2-butanone, n-valeraldehyde, 2-pentanone, 3-pentanone, ethylbutyraldehyde, and benzaldehyde in the concentration range of 30-1300 ppm. (Author abstract modified)

1969

26037 **APTIC NO. 47557**

Glowiak, B. and R. Palczynski

A STUDY OF THE ATMOSPHERIC DUST POLLUTION IN WROCLAW BY THE FILTER SOILING METHOD. *(Badanie zapylenia atmosfery miasta Wroclawia metoda zaczerniania filtrow). Air Conserv. (English translation from Polish of: Ochrona Powietrza), 3(2):23-30, 1969. 5 refs.*

NTIS: TT 70-55123/2

Filtration methods and devices used for atmospheric dust pollution measurement are described. One widely used method is to pass a known volume of air through a filter meter on which dust is trapped and then measure the amount of dust collected. Another method gaining popularity is to measure the degree to which the filtering material is soiled. Utilizing the Spekol spectrophotometer, studies of atmospheric pollution were conducted in Wroclaw, Poland, on the basis of the soiling of filter paper. Measuring accuracy was dependent on the position of the glow-tube lamp in the housing, and also on the light wavelength. The dust was observed to be much darker in winter than in spring and summer, which probably can be atributed to coal-fired heating equipment in operation in the winter.

1964

26038 **APTIC NO. 47553**

Okamoto, A. and H. Sekinari

DETERMINATION OF GASEOUS MIXTURES OF SO2, NO AND NO2. *Ryusan (J. Sulphuric Acid Assoc., Japan), 17(11):239-243, 1964. 4 refs. Translated from Japanese. 10p.*

Separation and determination of sulfur dioxide, nitric oxide, and nitrogen dioxide in reaction gases in the production of sulfuric acid by the chamber process is essential not only for controlling the operation of the production by the analyses of the systems but also for waste gas treatment which is a public health problem. The Russian method of analysis involves absorption by hydrogen peroxide and titration to determine sulfuric and nitric acid, iodimetric determination of sulfur dioxide, titration with alkali for determination of nitric oxide, with nitrogen dioxide decomposed for determination. Reagents and the analytical procedures are described.

1956

26039 **APTIC NO. 47555**

Pannetier, Guy, Claude Meltzheim, and Adrien Sicard

NEW METHODS FOR THE DETERMINATION OF BINARY OR TERNARY MIXTURES OF DILUTE SULFUR DIOXIDE AND TRIOXIDE AND HYDROGEN SULFIDE IN A GASEOUS MEDIUM. *Bull. Soc. Chim, France, no. 5:455-459, 1956. 13 refs. Translated from French. 13p.*

Methods for the determination of binary or ternary mixtures of dilute sulfur dioxide and trioxide and hydrogen sulfide in a gaseous mixture are described. Sulfur dioxide plus sulfur trioxide can be determined by passing the gaseous mixture into a solution of hydrogen peroxide of a known oxidimetric titer; the difference of this titer, after and before the passage of a known volume of gas, corresponds to the oxidation of SO2 by SO3. An acidimetric determination by sodium hydroxide, in the presence of a solution of methyl red and methylene blue as an end point indicator, then gives the total for SO2 and SO3 together. It is also possible to replace the hydrogen sulfide can be determined by a simple method based upon a single bubbling of the gas in an iodine solution and discoloration of the titrated solution of iodine. In the case of ternary mixtures, three linear equations are solved with oxidimetric titer and acidimetric information.

AIR QUALITY MEASUREMENTS

1972

26040 **APTIC NO. 47633**

Tokyo Metropolitan Government (Japan) Minato Ward Office

PUBLIC NUISANCE IN MINATO WARD, 1972, (DATA). *(Minato-ku no kogai, Showa 46-nendo, shiryo-shu). Text in Japanese. 199p., Oct. 1972.*

During the period of April 1971 to March 1972, there were 134 complaints filed on air pollution including offensive odors. Carbon monoxide concentrations at a busy intersection were measured July 14, 1971 and were as high as 13.5 ppm. At many other intersections they were over 10 ppm. The average nitrogen oxide concentration measured at the ward office from May 1971 to Dec. 1971 was 10.5 pphm, the highest in December and the lowest in August. There were 2022 licensed factories that passed inspections according to the regulations for pollution prevention.

26041 **APTIC NO. 47643**

Osaka Municipal Office (Japan)

REPORTS ON THE PUBLIC NUISANCE CONDITIONS IN 1971 AND THE POLICIES EMPLOYED FOR THE PREVENTION. *(Showa 46 nendo ni okeru kogai no jokyo oyobi kogai no boshi ni kanshite kokita shisaku ni kansuru hokoku). Text in Japanese. 340p., Sept. 1972.*

In 1971, approximately 8600 kl of heavy oil, 435 kt of coal, and 2.700 kt of coke were consumed in Osaka, and about 220 kt of sulfur dioxide were discharged, compared to 300 kt in 1970. There were 1,466,897 registered automobiles in 1971 which was nine times the number in 1957. The total amounts of nitrogen oxides and particulates discharged were 136.4 and 84.3 kt respectively. The yearly average concentrations of various pollutants at different industrial, residential, and school areas were measured. Measurement results showed the trend of decreasing NOx, particulates, and SO2 concentrations. The new national environmental standard for carbon monoxide says that the hourly average concentration for 8 consecutive hours should be below 20 ppm and that for 24 consecutive hours it should be below 10 ppm. The regulations for pollution prevention issued by the municipal government are also listed.

26042 **APTIC NO. 47652**

Hitachi Municipal Government (Japan)

A SURVEY OF PUBLIC NUISANCE IN HITACHI CITY. *(Hitachi-shi no kogai no gaikyo). Text in Japanese. 87p., June 1972.*

The average sulfur oxide and particulate concentrations measured in 1971 were 0.61 mg/100 sq cm/day lead dioxide and 8.17 t/sq km/mo, respectively; both decreased from 1968. The highest particulate concentrations were during April to May and Sept. to Oct. The SOx concentrations measured at four major locations were all below the environmental standards. There were about 40,000 automobiles in the city with a population of 200,000. The average carbon monoxide, nitrogen oxides, and lead concentrations measured on a given day in May at a major intersection were 2.9 ppm, 0.209 ppm, and 1.66 micrograms/cu m, respectively.

26043 APTIC NO. 47653

Amagasaki Municipal Office (Japan)

CONDITIONS OF PUBLIC NUISANCES AND THEIR COUNTERMEASURES. 1972. *(Kogai no genjo to taisaku, Showa 47-nendo). Text in Japanese. 237p., Dec. 1972.*

The conditions of pollution and the countermeasures for its preventions in Amagasaki city are given. In 1971, the city had a population of 552,000 with 2395 factories. The fuel consumption was about 1,830,000 kl of heavy oil. The average sulfur oxide, dust, and particulate concentrations decreased from 2.11 to 1.37 sulfur trioxide mg/100 sq cm/day lead dioxide, 0.140 to 0.122 mg/ cu m, and 11.48 to 8.19 t/sq cm/mo, respectively, from 1967 to 1971. The sulfur content of heavy oil decreased from 1.82 to 1.21% from 1969 to 1971. New agreements on the air pollution prevention have been established between the city government and 66 companies with many revisions including founding of a pollution control committee with the participation of residents.

26044 APTIC NO. 47693

Kita-Kyushu Municipal Government (Japan), Public Nuisance Control Bureau

POLLUTION IN KITA-KYUSHU CITY. NO. 6, 1972. *(Kita-Kyushu-shi no kogai, Showa 474-nendo ban). Text in Japanese. 356p., Sept. 1972.*

The state of air pollution, fuel consumption, sulfur dioxide, settling particles, suspended particulates, nitrogen oxides, carbon monoxide, and oxidants in Kita-Kyushu city are presented with data, countermeasures, regulations concerning emission sources, control facilities, inspections, emergency counter measures, meteorological factor information, and guidances to industries based on wind tunnel tests. The total 1971 fuel oil consumption by the city s major industries was 4,047,000 kl, 99.3% of which was consumed by various plants. Eighty-seven percent of the total fuel consumption in the amount of 3,504,000 kl was by 33 factories which come under the Air Pollution Control Act Item 23 for those industries which require emergency counter measures. The sulfur content in fuel oil decreased by 1.65% in 1971. The total smoke emission from the 33 factories was 5814 N cu m/hr. The total fuel coal consumption in 1971 was 604,000 tons, most of which were consumed at three electric power plants. The suspended particulate indexes in 1971 were much lower at the monitoring stations where high concentration was noted in 1970. Drastic fluctuation was noted from month to month at all monitoring locations, but generally, higher indexes appeared in spring, and slightly high indexes in fall. The hourly fluctuation patterns were similar at all the monitoring locations, peaks appearing between 8 and 10 am and 8 and 10 pm daily.

26045 APTIC NO. 47335

Conrads, L. A. and J. R. Wasserman

CARBON MONOXIDE AND AITKEN PARTICLES IN UTRECHT. *(Koolmonoxide en Aitkendeeltjes in Utrecht). Text in Dutch. Chem. Weekblad, 68(45):11-13, Nov. 1972. 14 refs.*

Results of carbon monoxide and Aitken particle measurements performed in and around Utrecht during the May-Oct. 1970 period are presented. The CO measurements were done by means of Draeger tubes delivering 10-minute means. The average CO concentrations measured at 50 cm and 200 cm above ground were in the respective ranges of 5-18 ppm and 4-11.5 ppm, and the maxima and minima for the two different heights were 0.5 ppm, as well as 26.5 and 20 ppm, respectively. The CO concentrations were higher at 50 cm than at 200 cm, which indicates that most of the CO originates from vehicles. The concentrations at 200 cm were considerably influenced by both the wind speed and the turbulence caused by solar radiation. The Aitken particle counts were significantly higher at 50 cm than at 200 cm, which again indicates the role of vehicle emissions. The Aitken particles counts obtained during rush hours in center city were by a power of about 10 higher than normal.

26046 APTIC NO. 47608

Dovgyallo, Ye. N.

HORIZONTAL VISIBILITY IN CITIES AND INDUSTRIAL AREAS. *(O gorizontal noy prozrachnosti v gordakh i promyshlennykh tsentrakh). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 279:154-160, 1972.*

Horizontal visibility measurements performed at 253 stations in different urban and industrial areas of the USSR territory are evaluated. The reduction in the horizontal visibility as observed over the past years is due to industrial emissions. The probability of visibilities of less than 10 km is higher for industrial areas and big cities than for smaller localities without industry. The increased probability of visibilities of less than 10 km in industrial areas is mainly due to the increase of visibility cases of 4-10 km, while that in smaller urban areas is a result of the increased frequency of visibilities smaller than 4 km. The maximum frequency of 4-10 km visibility cases in winter is due to inversions. The yearly variations in the visibility for a given area have roughly identical pattern.

26047 APTIC NO. 47396

Futsuhara, Natsuko and Naoomi Yamaki

STUDIES ON PHOTOCHEMICAL AIR POLLUTION (I) – SIMULTANEOUS MEASUREMENTS OF OXIDANTS AND OZONE. *(Kokagaku taiki osen ni kansuru kenkyu (I) – Okishidanto to ozon no doji sokutei kekka). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 7(5): 209-216, Sept. 1972. 2 refs.*

Concentrations of oxidants and ozone were simultaneously and continuously monitored in Kawaguchi city. Both peak values measured in the daytime tended to coincide, suggesting a photochemical reaction source. Correlations were drawn for the measured values. At night, the oxidant value was generally higher, while ozone concentrations were greater in the daytime. The performance of the ozone analyzer was also studied to determine the effect of sample air flow rate and ethylene pressure.

26048 APTIC NO. 47661

Hasegawa, T.

PRESENT STATUS OF AIR POLLUTION IN OSAKA. *(Osaka ni okeru taiko osen no genjo). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(5):53-65, Oct. 1972.*

Measurements of dust in the atmosphere in Osaka City date back to 1922, however, since the switch was made from coal to oil, pollution from sulfur oxides has increased. Nitrogen oxides, hydrocarbons, and lead compounds from automobiles has increased as well. The concentration of sulfur oxides started to decrease in 1969 and decreased drastically in 1971. High-volume air sampler measurements in 1970 at four spots in Osaka exceeded 200 micrograms/cu m, the maximum in one spot reaching 335 micrograms/cu m. Iron in the dust was 21.3 micrograms/cu m maximum; lead had a maximum annual average of 3.66 micrograms/cu m. Since 1970, the average dust at 15 monitoring spots in industrial areas was 20.23 t/mo/sq m. However, there has been slight decrease in all areas. An eightfold increase in the number of automobiles from 1957-1970, caused a CO monthly average at one monitoring spot of 2-3 ppm, but it sometimes exceeded 10 ppm. Nitric oxide s monthly average for 1 hour was 0.096 ppm in Dec. 1970. Nitrogen dioxide s monthly average was 0.064 ppm in June 1970. The maximum hourly oxidant was 0.24 ppm in Aug. 1970.

26049 **APTIC NO. 47636**

Hishida, K.

THE ACTUAL STATE OF AIR POLLUTION. *(Tokyoto ni okeru taiki osen no genjo). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(5):26-52, Oct. 1972. 14 refs.*

The degree of pollution in Tokyo is discussed including nitrogen oxides, oxidants, and primary and secondary pollution. Wind direction and velocity, atmospheric stability, temperature, ultraviolet rays, humidity, visibility, topography, sea breezes, roads, and buildings affect the formation of secondary pollutants. Telemeterized measurements of sulfur oxides, nitrogen oxides, carbon monoxide, oxidants, hydrocarbons, aerosols, wind direction, wind velocity, temperature, ultraviolet radiation, and traffic volume are carried out in Tokyo. In 1971 the concentration of SOx decreased drastically to 0.33 ppm from 1969 s 0.052 ppm and 1970 s 0.045 ppm. The annual average of aerosol decreased to 52 in 1971 from 1968 s 100 and 1969 s 124. Nitric oxide has leveled off since 1967, but nitrogen dioxide is rising slightly. There has been a slight decrease in carbon monoxide. Not much data on continuous monitoring of oxidant is available, except at one spot. The number of warnings because of the generation of over 0.15 ppm of oxidant was seven in 1970 and 17 up to July 30, 1972.

26050 **APTIC NO. 47505**

Muniak, S. E.

LONG-TERM MONITORING OF SURFACE ATMOSPHERIC LEAD AT ARGONNE. *In: Radiological Physics Division Annual Report. Environmental Research. January through December 1971. Argonne National Lab., Ill., Radiological Physics Div., Rept. ANL-7860, p. 151-161, 1972. 31 refs.*

The concentration of lead in the surface air at Argonne, Illinois, was determined for 43 months. Two units of measurement were employed: mg/cu m and micrograms/100 mg surface atmospheric particulates. The weighted mean for each season was the most meaningful value. The source of lead in the surface atmospheric particulates was primarily automobile exhaust. The size range of the lead particulates is sufficiently small to reach and deposit on human alveoli. A typical value of lead entering the blood circulation through breathing air at Argonne is 1680 ng/day. Values of lead intake through food and beverage consumption and through cigarette smoking are included. A background level of lead in the atmosphere is given as 3 ng/cu m at mid-Pacific ocean aboard ship. The level of motor gasoline consumption in the United States is included; 91 billion gallons of gasoline were consumed in 1970. Virtually all of this gasoline contained lead, a total of 239,600 tons. Fifty-seven percent of this total content is emitted in auto exhaust and released into the atmosphere. This gives a total mass released into the atmosphere of 136,500 tons. (Author abstract modified)

26051 **APTIC NO. 47350**

Nakano, Michio

AIR POLLUTION AT OSAKA, ITS TRANSITION AND THE PRESENT CONDITION. *(Osaka no taiki osen, sono suii to genjo). Text in Japanese. Rodo no Kagaku (Dig. Sci. Labor), 27(23):38-60, Feb.-March 1972.*

Fuel consumption and sulfur dioxide emission, pollution condition, automotive exhaust pollution, and Osaka s clean air plans are discussed. The emission quantity of sulfur dioxide increased between 1967 and 1969. The amount of total fuel consumption increased after that, but SO2 emission decreased. The 12 monitoring locations in the city have annual averages of sulfur trioxide concentration between 0.051 and 0.078 ppm, which are the highest in the Prefecture. Suita city also has a high yearly average of 0.074 ppm. Suspended particulates measured by high-volume air samplers in two districts of Osaka have a yearly average of 335 micrograms/cu m and 324 micrograms/cu m. As much as 21.3 micrograms/cu m of iron can be found in dusts in one area. The highest lead content was in Suita City Hall (3.66 micrograms/cu m); the highest 24-hour average was 9.14 micrograms/cu m. Nitrogen dioxide and nitric oxide concentrations are also discussed. Plans for lowering SO2 are called the blue sky plans; the sulfur content in fuels and emissions will be reduced in three stages; heating systems of electric or gas will be used in the future.

26052 **APTIC NO. 47782**

Yobs, A. R., J. A. Hanan, B. L. Stevenson, J. J. Boland, and H. F. Enos

LEVELS OF SELECTED PESTICIDES IN AMBIENT AIR OF THE UNITED STATES. *Preprint, American Chemical Society, Washington, D. C., 54p., 1972. 14 refs. (Presented at the American Chemical Society, National Symposium on Pesticides in Air, Boston, Mass., April 11, 1972.)*

Pesticides in the ambient air were monitored over a two-year period at 45 sites throughout the United States to define the extent of contamination and the contribution to man s total exposure. Sampling equipment, locations, schedule, and procedure, analytical techinques, and survey results are reviewed. The pesticides pp DDT, pp DDE, Dieldrin, op DDT, a BHC, and g BHC were determined in measurable amounts in more than 50% of the samples collected each year; pp DDT, op DDT, and Dieldrin were found at all sites but not in all samples in 1970. Only pp DDT was found at all sites in 1971. Levels did not approach the threshold limits or maximum acceptable daily intake, but respiration of air containing some of the higher levels would contribute to the individual s total pesticide exposure. A greater variety of pesticides was found in urban commercial areas, followed in order by rural farm, urban residential, urban agricultural, and rural non-farm. Most, but not all, of the maximum levels occurred in agricultural situations, whether urban or rural. (Author summary modified)

1971

26053 **APTIC NO. 47613**

Tokyo Metropolitan Government (Japan), Nerima District Dept. of Environmental Protection

INVESTIGATION ON ENVIRONMENTAL POLLUTION BY AUTOMOBILE EXHAUST GAS. 1. POLLUTION BY CARBON MONOXIDE. *(Jidosha haiki gasu kankyo osen chosa. Daiippo. Issanka tanso ni yoru osen ni tsuite). Text in Jpaanese. 52p., 1971.*

Field tests were conducted at 12 intersections with heavy traffic in Tokyo s suburbs. The purposes were to examine the actual conditions of automobile pollution at congested intersections of various sections of Nerima district by measuring concentration of carbon monoxide (8-hour averages, 24-hour averages, maximum, minimum, and difference from the air standard), to see the transition patterns, to examine various factors causing heavy pollution such as wind direction, wind velocity, weather, atmospheric stability, traffic quantity, congestion, surrounding buildings, sidewalk width, topography, and the width of the road, to obtain the pollution index of each intersection, and to use the results for the future prevention plans. Samples were taken in vinyl bags by air samplers and analyzed by a non-dispersion infrared analyzer. Pollution peaks appeared twice a day, morning peaks less frequently than evening peaks, and the morning concentrations lower than evening concentrations. The pollution patterns were different between large and small intersections. At small intersections, high pollution concentrations appeared easily, and the frequency of more than 10 ppm (24-hour average) was relatively high.

26054 **APTIC NO. 47692**

Kita-Kyushu Municipal Government (Japan), Public Nuisance Control Bureau

POLLUTION IN KITA-KYUSHU CITY. NO. 5 - 1970. (Kita-Kyushuishi no kogai, dai-go-go, Showa 45 nendo). Text in Japanese. 225p., Sept. 1971.

The number of air pollution monitoring stations in Kita-Kyushu city was increased by four in 1970, and presently nine stations are monitoring the environment continuously. The highest hourly index (monthly average) of sulfur dioxide for 1970 was in July in the Wakamatsu area (0.097 ppm). All the stations showed generally high concentrations between April and July. The year s average for the hourly index in Wakamatsu was 0.056 ppm, and in Tobata was 0.051 ppm. The air quality consistently failed to pass the SO2 environmental standard of 0.05 ppm in both areas. Compared to the 1969 records, indexes at Yawata and Kurosaki were lower in 1970, but all other seven stations indexes were higher. When SO2 concentration was higher than 0.1 ppm, the wind direction was predominently from the direction of the bay in northwest. In general, when the wind velocity was less than 3 m/sec, a high concentration of SO2 seemed to occur. Twenty percent of high concentrations (higher than 0.1 ppm) occurred when there was no wind, and 95% of all high concentration occurred when the wind was slower than 6 m/sec. One of the nine monitored areas failed to pass all the environmental standards, and at two other areas, more than 70% days of the year showed a SO2 concentration higher than 0.05 ppm.

26055 **APTIC NO. 47452**

Conway, J. G., H. R. Bowman, F. Asaro, and L. Y. Goda

DETERMINATION OF ATMOSPHERIC LEAD, BROMINE, AND IRON BY NON- DISPERSIVE X-RAY FLUORESCENCE. *In: Nuclear Chemistry. Annual Report. 1971. California Univ., Lawrence Berkeley Lab., UC-4 Chemistry, TID-4500 (59th Ed.), p. 301-302, 1971. 2 refs.*

NTIS: LBL-666

Each of 400 filter papers collected weekly for 8 years in a downtown area of Berkeley, Calif. was analyzed for 2 minutes on a X-ray fluorescence spectrometer. The lead and bromine concentrations were obtained by summing a number of channels over the Pb L alpha and Br K alpha peaks, substracting nearly negligible backgrounds, and comparing the results to standards treated in the same manner. A number of techniques were used to calibrate the filter papers for lead and bromine. The Pb and Br concentrations for 1963 to 1970 are presented graphically. Although a Br to Pb weight ratio of 1:60 has been reported for six cities of the U. S., a ratio of 1:3.2 was found in Berkeley, which is closer to the ratio for automobile exhaust gases. Seasonal variations correlated well with climatologic data for wind direction and speed. Samples were also taken near a highway in Emeryville, Calif. and were determined for iron, Pb, and Br. Wind direction, wind velocity, and traffic patterns affected the pollutant concentrations.

26056 **APTIC NO. 47535**

Dams, R., J. A. Robbins, K. A. Rahn, and J. W. Winchester

QUANTITATIVE RELATIONSHIPS AMONG TRACE ELEMENTS OVER INDUSTRIALIZED N. W. INDIANA. *Preprint, American Chemical Society, Washington, D. C., p. 139-157, 1971. 7 refs. (Presented at the American Chemical Society National Meeting, 161st, Los Angeles, Calif., March 28-April 2, 1971.)*

A series of 25 simultaneous air filter samples taken over the heavily industrialized area of Northwest Indiana and nearby rural locations was analyzed for 30 trace elements by nondestructive neutron activation analysis. From the concentration isopleths and coefficients of variance, while some elements showed only minor variations over the area, others showed marked concentration increases near large industrial complexes, indicative of important local pollution sources. These trends were also reflected in similarities or differences between geometric mean concentrations over the central industrial versus surrounding areas. Particulate composition was in close agreement with an earlier emissions inventory of the area. Ratios of rare earths, calcium-magnesium, and selenium-sulfur appear to be in agreement with those of their suspected sources, namely clay minerals, dolomite, and combustion of fuels. A strong relationship between several elements likely to have common sources is demonstrated by linear correlation coefficients, mathematical cluster analysis, and point regression techniques. Pollution elements such as iron, manganese, zinc, antimony, chromium, tungsten, cobalt, scandium, lanthanum, cerium, thorium, calcium, and magnesium seem to be linked strongly to the local steel production and supporting industries. Copper, though also apparently of industrial origin, has a different major source location. The elements sodium, potassium, samarium, and europium, all having low coefficients of variation, are grouped together by the cluster analysis and appear to have sources not unique to industrial areas. (Author abstract modified)

26057 **APTIC NO. 47362**

Rusina, Ye. N.

EVALUATION OF THE ATMOSPHERIC TURBIDITY ACCORDING TO ACTINOMETRIC DATA. *(Otsenka mutnosti atmosfery po actinometricheskim dannym). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 254:190-197, 1971. 5 refs.*

The degree of air pollution over various regions of the USSR territory was evaluated from actinometric measurements of the direct solar radiation. The general turbidity background showed decreasing turbidity from the South toward North with a distinct zone of increased atmospheric turbidity at temperate latitudes, which is most probably due to industry-generated air pollution in such areas. The atmospheric turbidity at southern and temperate latitudes showed regular, simple yearly variation with maximum in July and minimum in December, while two maxima and two minima of the turbidity at northern latitudes were observed. The reduced atmospheric turbidity during spring at temperate latitudes was apparently due to mass exchange in the atmosphere. The turbidity-reducing effect of washout, considerable during fall, was practically negligible in summer due to the specific nature of the precipitation in that season, and was further lessened by turbid masses lying at great altitudes. Daily variations of the turbidity showed maximums during noontime hours. Investigations of the yearly variations of the atmospheric turbidity in Leningrad, Moscow, and Irkutsk and their respective suburbs revealed that the average yearly turbidity in these cities was 13-28% higher than in their suburbs, with greatest differences, reaching up to 74%, in winter. The differences in the turbidity of cities and their suburbs in temperate latitudes were lowest during fall and spring as a result of self-purification of the atmosphere in such cities. The yearly variation of the turbidity in cities was basically different from that in their suburbs in that cities, having a maximum during late spring to early summer just like their suburbs and having another maximum in winter.

1970

26058 **APTIC NO. 47543**

Zutshi, P. K., R. Sequeira, T. N. Mahadevan, and Tapoti Banerjee

ENVIRONMENTAL CONCENTRATIONS OF SOME OF THE MAJOR INORGANIC POLLUTANTS AT THE BARC SITE, TROMBAY, BOMBAY. *Indian J. Meteorol. Geophysics, 21(3):473-478, July 1970. 11 refs.*

Aggregate monthly averages of some of the major inorganic pollutants in the atmosphere, at the Bhabha Atomic Research Centre site at Trombay, Bombay, are presented for the past two years. With a view to broadly assess the extent of air pollution at the sampling site, the results are compared with known international air quality standards. Since Trombay is located approximately 10 km due NW from the heart of the city of Bombay, the measurements cannot be considered representative of the metropolitan city. Oxides of nitrogen and oxidants generally were determined at relatively lower concentrations than sulfur dioxide and ammonia. Southwesterly winds, which can bring the city air directly to Trombay, were more frequently from March-April and July-August, which is around the time the greatest concentrations of pollutants were observed. Particulate matter, including total dust load, benzene soluble organics, water soluble fractions, hydrogen chloride soluble fractions, and acid insoluble fractions were determined. Sulfates, chlorides, nitrates, and the ammonium radical in the water soluble fraction were measured. (Author abstract modified)

ATMOSPHERIC INTERACTION

1972

26059 **APTIC NO. 47334**

PHOTOCHEMICAL SMOG. *Conn. Med., 36(5):286-287, May 1972. 2 refs.*

There is no doubt that motor vehicles are the principal outlets for photochemical smog in large cities for they are the sources for the unburned hydrocarbons, sulfur dioxide, and smoke. Meteorological conditions are also important, for the sequence of reactions leading to photochemical smog requires the production of significan ozone concentrations sufficiently near the ground for the unburned hydrocarbons not to have been dispersed by diffusion or by wind. The remedy if any is for drastic reduction in the use of the internal combustion engine.

26060 **APTIC NO. 47506**

Ackerman, Bernice

A FIELD PROGRAM TO STUDY THE URBAN WIND FIELD. METROMEX 1971. *In: Radiological Physics Division Annual Report. Environmental Research. January through December 1971. Argonne National Lab., Ill., Radiological Physics Div., Rept. ANL-7860, p. 162-182, 1972. 6 refs.*

Special wind observations were made in the St. Louis area during the summer of 1971 for the purpose of delineating the flow field in the boundary layer overlying a metropolitan complex. Balloons released from nine locations were tracked to a height of 2 km using the double-theodolite technique. Releases were made at 20-minute intervals for periods of 3 hr. On 10 days these observations were complemented by airplane measurements of wind velocity, temperature, and humidity. The program yielded nearly 30 hours of flight measurements and 1600 wind soundings, of which over 2/3 were in urban and suburban areas. The design and execution of the field experiment are described in detail, and examples of the data are shown. (Author abstract)

26061 **APTIC NO. 47508**

Ackerman, Bernice

AN URBAN-RURAL COMPARISON OF HUMIDITY. *In: Radiological Physics Division Annual Report. Environmental Research. January through December 1971. Argonne National Lab., Ill., Radiological Physics Div., Rept. ANL-7860, p. 193-205, 1972. 6 refs.*

Hourly observations of dew point at Chicago Midway Airport and Argonne National Laboratory were used in a study of the effect of urbanization on humidity. Pronounced temporal variations were found in the differences between the city and country dew points and vapor pressures. On the average, the city is less humid than the country only during the forenoon and on afternoons during the growing season. The city tends to be more humid the rest of the time, with the largest urban-rural difference occurring on summer nights. It is hypothesized that the nocturnal positive humidity differences are due to preferential flux of moisture from air to ground in the country, whereas the positive difference occurring in the afternoon during most of the year are due to advective processes or special sources of moisture in the city. The negative urban-rural differentials no doubt reflect greater evapo-transpiration in the country. The relationship found between dew point differences and vertical dew point gradients tends to support these hypotheses. The urban-rural difference in dew point was inversely related to cloud cover and to wind speed. However the relationships were weak, probably because of the univariate approach to this complex problem. (Author abstract)

26062 **APTIC NO. 47751**

Ackerman, Bernice

WINDS IN THE EKMAN LAYER OVER ST. LOUIS. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 22-27, 1972. 5 refs. (Presented at the Conference of Urban Environment and Second Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

The Ekman layer is a zone of transition between the surface layer, in which surface stresses strongly influence the air motion, and the free atmosphere in which the larger scale pressure forces dominate. The wind field in this planetary boundary layer was investigated to determine the magnitude and depth of the urban modification of the airflow. Measurements of wind speed and direction, pressure gradient, temperature, and atmospheric movements were taken over St. Louis to determine the extent to which the flow was accelerated because of frictional effects and to define the existence and strength of a thermally-induced urban circulation. In both instances, the height to which effects are significant was an integral part of the problem. Results of measurements during the nighttime urban circulation studies are presented.

26063 **APTIC NO. 47752**

Blackburn, Thomas M.

POTENTIAL USE OF THE RAMOS IN URBAN METEOROLOGY. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 8-10, 1972. 3 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

A remote automatic meteorological observation system (Ramos) was developed to provide an economical source of observations from remote areas both with and without conventional landline telecommunications. The system was programmed to observe and transmit up to 13 parameters, seven of which are already automated, i.e., temperature, dew point, wind direction, wind speed, station pressure, cumulative precipitation, and occurrence of precipitation. A sensor designed to report peak wind speed during the interval between observations will be developed. A network will consist of as many as 25 remote stations feeding real-time data into a central station, where a computer will process the data into usable form. The development plan is presented.

26064 **APTIC NO. 47737**

Bornstein, Robert D.

TWO-DIMENSIONAL NON-STEADY NUMERICAL SIMULATIONS OF NIGHTTIME FLOW OF A STABLE PLANETARY BOUNDARY LAYER OVER A ROUGH WARM CITY. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 89-94, 1972. 13 refs.*

(Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)

A two-dimensional non-steady model of the nocturnal flow of a stable atmosphere over an infinitely wide, warm city was developed. The model consists of two layers, a lower analytical constant flux layer of 25 m and an upper numerical transition layer of 1875 m, at the top of which these fluxes are assumed to have decreased to zero. Assumed eddy viscosity profiles computed from equations overcame problems associated with formulations which depend on local stability, e.g., impediment of downward heat fluxes. However, other problems arose which specified that stability changes in the constant flux layer immediately influence eddy coefficients in the transition layer. Values of K in the stable air over the city were too large due to the slightly unstable layer near the surface. The increased mixing which resulted could have wiped out any remnants of the rural inversion layer being advected over the city, and thus none were found at the urban sites. (Author conclusions modified)

26065 **APTIC NO. 47748**

Bornstein, Robert D., Arndt Lorenzen, and Douglas S. Johnson

RECENT OBSERVATIONS OF URBAN EFFECTS ON WINDS AND TEMPERATURES IN AND AROUND NEW YORK CITY. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 28-33, 1972. 12 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

Meteorological observations collected in New York City were analyzed as part of a large study of urban air pollution to determine the effects of an urban area on the horizontal wind field near the surface and on the horizontal and vertical moisture fields over the city. Hourly averages of wind speed and direction and data on stability conditions, temperature, pressure, and relative humidity were computed. At night, a critical wind speed (8.5 mi/hr) was determined below which air was accelerated due to horizontal pressure gradients produced by a well-developed urban heat island, as it flowed over a rough, heated city. Above this critical wind speed, air was decelerated as it flowed over the city, due to the increased urban surface roughness. A moisture excess existed over the city during the study period and was reflected in higher values of absolute humidity over the city as compared to those at nearby non-areas, although relative humidity over the city as compared to those at nearby non-areas, although relative humity values were lower over the city due to its well developed urban heat island. Differences were greater during early morning hours than during midday hours and were greatest over the center of the city. (Author conclusions modified)

26066 **APTIC NO. 47512**

Carson, James E.

THE ATMOSPHERIC CONSEQUENCES OF THERMAL DISCHARGES FROM POWER GENERATING STATIONS. *In: Radiological Physics Division Annual Report. Environmental Research. January through December 1971. Argonne National Lab., Ill., Radiological Physics Div., Rept. ANL-7860, p. 250-271, 1972. 38 refs.*

Concern for the biological and ecological effects of heated water has resulted in legal actions that will prevent power companies from dumping the waste heat from the majority of their new generating units into rivers and lakes. Many nuclear and fossil-fueled plants now under construction, and even some now on-line, are being required to change from once-through cooling systems to other methods, such as wet cooling towers, cooling ponds, and spray canals, despite higher costs and lower thermal efficiencies. Yet, these alternate cooling procedures are not without their own environmental problems. The primary weather change due to once-through cooling on a large water body is a local increase in fogginess at the plant outfall. However, the relative probability of significant local meteorological effects is much higher with alternate cooling procedures, since these reduce the area of heat and moisture transfer. From a meteorological point of view, the least undesirable way to dispose of waste heat is by using once-through cooling on large water bodies. (Author abstract modified)

26067 **APTIC NO. 47338**

Chester, R., H. Elderfield, J. J. Griffin, L. R. Johnson, and R. C. Padgham

EOLIAN DUST ALONG THE EASTERN MARGINS OF THE ATLANTIC OCEAN. *Mar. Geol., 13(2):91-105, Sept. 1972. 26 refs.*

Eolian dust was collected by several sampling methods from the marine atmosphere of the major wind systems along the eastern margins of the Atlantic Ocean between about 27 deg N and 34 deg S. The northeast trades had the highest dust loadings of the various major wind systems in the Eastern Atlantic, mostly due to the presence of the Sahara Desert which acts as a large scale reservoir for atmospheric dust. In contrast, the Namib Desert has a much smaller effect on dust loadings in the southeast trades. The clay mineralogy of the dusts clearly reflects the weathering characteristics of the source soils of the adjacent land masses. The distribution of kaolinite, illite, and chlorite in the dusts closely parallels that in the underlying deep-sea sediments. Quartz is a major constituent of the bulk samples of northeast trade dusts. Eolian dust probably makes a significant contribution to the inorganic land derived material in the upper few meters of sea water in the area of the northeast trades. Particle size is mentioned. (Author conclusions modified)

26068 **APTIC NO. 47422**

Chow, Tsaihwa J., John L. Earl, and Carrie B. Snyder

LEAD AEROSOL BASELINE: CONCENTRATION AT WHITE MOUNTAIN AND LAGUNA MOUNTAIN, CALIFORNIA. *Science, 178(4059):401-402, Oct. 27, 1972. 8 refs.*

The seasonal trend of lead aerosol concentration at two mountainous locations which are virtually uninhabited and far above the thermal (radiation) inversion level was investigated to determine if the lead aerosol content approaches the continental baseline concentration. Based on air quality measurements, the concentration at White Mountain, California may be regarded as the present baseline concentration for atmospheric lead for the continental United States. The seasonal investigations at White Mountain and Laguna Mountain determined a summer maximum and a winter minimum. The annual average lead aerosol concentrations were 0.0080 micrograms/cu m for White Mountain and 0.048-0.070 micrograms/cu m for Laguna Mountain. (Author abstract modified)

26069 **APTIC NO. 47735**

Daniels, Anders, Richard H. Jones, and Wilfrid Bach

26070 **APTIC NO. 47738**

Drake, Ronald L., Daniel Anderson, and Celeste P. Peterson

REGIONAL AIR-POLLUTION MODELING: ST. LOUIS AREA. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 95-98, 1972. 4 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

A large-scale numerical model was developed to supplement field studies on the pollution plume emitted by the city of St. Louis to determine the contribution of urban pollution to regional and global pollution. Some of the major parameters included the time and space domains, independent and dependent variables (flow field, pressure, density, absolute temperature, radiant energy, precipitation, and transport), the system of equations, super-domain scales, sub-grid scale motions, initial and boundary conditions, numerical techniques for calculating surface topography, background pollutant values, and variations of meteorological data, the time step, and mesh size.

26071 **APTIC NO. 47370**

Egan, Bruce A. and James R. Mahoney

APPLICATIONS OF A NUMERICAL AIR POLLUTION TRANSPORT MODEL TO DISPERSION IN THE ATMOSPHERIC BOUNDARY LAYER. *J. Appl. Meteorol., 11(7):1023-1039, Oct. 1972. 23 refs.*

A numerical advection-diffusion air pollution transport model was used to describe dispersion of emissions from urban area type sources for several atmospheric stability situations. The estimation of appropriate velocity and diffusivity fields for use as meteorological input data is discussed. Profiles representing the constant-flux surface layer were used in a nondimensional transport equation to obtain concentration fields over a limited horizontal and vertical scale. A wind spiral model and diffusivity profile after Blackadar were used to simulate dispersion under neutral stability conditions on an urban scale and in three dimensions for both a steady source and a single puff. Based on analyses of the trajectory and spread statistics for the puff, the combined effect of vertical diffusion and transverse wind components resulted in effective cross-wind diffusion coefficients an order of magnitude greater than typical values of vertical diffusion coefficients. Superposition of the concentration field of a two-dimensional calculation demonstrated the effect of differential spatial distributions of sources on ground level concentrations. Diffusivity profiles were postulated for investigating the effects of varying stability and mixing height on concentration distributions on an urban scale. Ground level concentrations varied by a factor of three or so over a range of stability conditions from neutral to slightly unstable for infinite mixing heights. The influence of time variations of mixing height on ground level concentrations was examined in terms of the relative meteorological time scales and corresponding departures from quasi-steady-taste concentration values. (Author abstract modified)

26072 **APTIC NO. 47754**

Egan, Bruce A. and James R. Mahoney

MODELING TOOLS FOR URBAN AIR POLLUTION PREDICTION STUDIES. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 49-56, 1972. 6 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

The application of various atmospheric dispersion models to different classes of air pollution impact problems is examined. Modeling tools appropriate for three basically different types of air pollution dispersion analyses are treated. The first involves the use of a generalized multiple source model for studies involving point, line, and area source contributions within a single problem and requiring detailed knowledge and use of differences in emission heights, plume rise factors, and receptor locations. The second considers a simplified but limited adaptation of the Gaussian-type model appropriate for area-type sources. Finally, the application of a numerical advection diffusion simulation model to studies involving time and/or spatially varying meteorological and emission inputs is examined.

26073 **APTIC NO. 47749**

Fosberg, Michael A., Albert Rango, and William E. Marlatt

WIND COMPUTATIONS FROM TEMPERATURE FIELD IN AN URBAN AREA. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 5-7, 1972. 1 ref. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

A procedure for computing windflow patterns from temperature data was developed based on the circulation theorem of baroclinic fluids transformed and integrated to provide a relatively simple computational scheme. The computational model and preliminary results of field tests and calculations are presented.

26074 **APTIC NO. 47510**

Gatz, D. F.

ARGONNE RAIN SCAVENGING STUDIES IN METROMEX-1971. *In: Radiological Physics Division Annual Report. Environmental Research. January through December 1971. Argonne National Lab., Ill., Radiological Physics Div., Rept. ANL-7860, p. 213-218, 1972. 2 refs.*

During the summer of 1971, samples of aerosols and rain were collected in the St. Louis area for chemical analysis and calculation of washout ratios. This was one component of METROMEX-1971--a broad investigation of urban effects on local weather carried out jointly by a number of groups and institutions. Samples were collected at five locations, some upwind and some downwind of the city. Sampling sites, equipment, results to data, and tentative plans for 1972 are described. A sample chart shows where and when the various types of samples were collected. High-volume filter samplers were used to collect aerosols near ground level on 11-centimeter diameter Whatman-41 filter paper. Aerosol collections for size distribution determinations were made using 8-stage Andersen impactors. The small vacuum pumps used to draw air through the Andersen samplers were also used for occasional short period filter sampling on 2.5-cm diam Whatman-41 paper. Daily rain samples were collected by 10-in. polyethylene funnels drained into polyethylene bottles; sequential rain samples were collected in automatic samplers. Results to date are limited to careful checks of the accuracy and reproducibility of the analytical procedures for the various kinds of samples. (Author abstract modified)

26075 **APTIC NO. 47511**

Gatz, D. F., D. L. McCarty, and M. R. Koors

FILTRATION: ITS EFFECT ON THE ACCURACY OF RAIN WATER ANALYSIS BY ATOMIC ABSORPTION SPECTROPHOTOMETRY. *In: Radiological Physics Division Annual Report. Environmental Research. January through December 1971. Argonne National Lab., Ill., Radiological Physics Div., Rept. ANL-7860, p. 219-229, 1972. 12 refs.*

An investigation was undertaken to determine what error, if any, is made in rain water analysis by atomic absorption spectrophotometry if the soluble and insoluble components are not analyzed separately. Twelve precipitation samples were collected, and each was divided into two equal parts. One part was filtered and its soluble and insoluble fractions analyzed separately. The unfiltered part was analyzed with no pretreatment. Six elements were determined: copper, iron, lead, magnesium, manganese, and zinc. The total concentration in the filtered portion was significantly greater than the concentration found in the unfiltered portion in at least one of the four rains sampled for each element. Furthermore, the concentration measured in the unfiltered portion is somewhat greater than that of the soluble component of the filtered portion, indicating that some, but not all, of the insoluble material is detected in the atomic absorption method. The fraction of each element found in the soluble portion of precipitation samples varies between elements, and for a given element, between rains. Part or all of this variation may be due to differences in sample handling. (Author abstract modified)

26076 **APTIC NO. 47743**

Gatz, Donald F.

WASHOUT RATIOS IN URBAN AND NON-URBAN AREAS. *Preprint, American Meteorological Society, Boston, Mass, and American Inst. of Medical Climatology, Philadelphia, Pa., p. 124-128, 1972. 6 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

Washout ratios for several metallic airborne elements were measured simultaneously in both urban and rural areas in the St. Louis area. Washout ratios for copper, iron, lead, magnesium, manganese, and zinc, determined by analysis of aerosol and precipitation samples, remained constant from upwind to downwind across the metropolitan area, although concentrations in both air and precipitation were substantially higher downwind. Differences among the several elements were evident, with the highest and lowest mean washout ratios for Mg and Pb, respectively. Large positive correlations were determined among washout ratios for some pairs of elements. (Author conclusions modified)

26077 **APTIC NO. 47756**

Gifford, Frank A.

APPLICATIONS OF A SIMPLE URBAN POLLUTION MODEL. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 62-63, 1972. 6 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

The application of a simple urban pollution model to calculating the time variation of the concentration of an inert pollutant, e.g., carbon monoxide emitted by motor vehicles, is considered. A simple formula was developed to describe the area-source component of urban air pollution, including as model parameters air pollution concentration, area source strength, average wind speed, and a dimensionless constant. In addition to correlating well with annual and seasonal urban pollution area patterns, and with shorter term pollution averages and patterns down to an hour, the equations also successfully describes the diurnal variability of urban CO pollution.

26078 **APTIC NO. 47709**

Gushchin, G. P.

THE PHOTOCHEMICAL THEORY OF ATMOSPHERIC OZONE. *(Fotokhimicheskaya teoriya atmosfernogo ozona). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 279:94-127, 1972. 28 refs.*

General considerations on the factors involved in the formation and distribution of atmospheric ozone are given, and a modified photochemical theory of atmospheric ozone is presented. The photodissociation of molecular oxygen occurring in the 30-to-50 km layer of the atmosphere is due to the solar ultraviolet radiation in a spectral range of 190-240 nanom. The presence of nitric oxide and nitrogen dioxide under diurnal stationary conditions results in reduced ozone concentration in the entire ozone layer, but this reduction in layers above 20 km is negligible. The reduction in atmospheric layers below 20 km is higher for lower than for higher layers, e.g., it is about 50% for 20 km, and practically 100% for 10 km. Increased water vapor concentration in the atmosphere in the presence of solar ultraviolet radiation results in reduced ozone concentration and in reduced life of atmospheric ozone in the lower 35 km layer. A comparison of theoretically calculated and measured ozone distributions shows great divergences due to atmospheric motion.

26079 **APTIC NO. 47744**

Hanna, Steven R.

A SIMPLE MODEL FOR THE ANALYSIS OF PHOTOCHEMICAL SMOG. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 120-123, 1972. 7 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31- Nov. 2, 1972.)*

A simple urban dispersion model was expanded to account for chemical reactions in the atmosphere, e.g., photochemical smog formation. The major equation parameters include local area source strength, wind speed, stability conditions, altitude, and pollutant concentration. Kinetic mechanism are proposed for the rate of production of nitric oxide, nitrogen dioxide, and related hydrocarbons. Data on air quality measurements and related smog analysis in selected urban areas of Hawaii and the Los Angeles basin are tabulated.

26080 **APTIC NO. 47327**

Ishizaka, Yutaka

ON MATERIALS OF SOLID PARTICLES CONTAINED IN SNOW AND RAIN WATER: PART 1. *J. Meteorol. Soc. Japan, 50(4):362-375, Aug. 1972. 22 refs.*

Snow and rain water samples were collected at a site on the coast of the Hokuriku district in February and March 1970 and rain water samples were collected at a site on Mt. Odaigahara in July 1970. Solid particles contained in snow and rain water samples were analyzed by means of X-ray, infrared, and electron optical methods. Most of the solid particles in snow samples were found to be soil particles originating from the arid or semi-arid regions of North China and Mongolia; these soil particles are considered to play an important role as ice nuclei in the formation of snow crystals in the season of northwest monsoon. At both sites, rain water samples precipitated from the air mass which did not pass through the arid or semi-arid regions of the continent of Asia and stayed over the ocean for a long time contained a small quantity of solid particles. Rain water samples collected from rainfall due to Typhoon 7002 contained a very small quantity of solid particles, which were identified as alpha-quartz, alpha-cristobalite, pyroxene, and an unidentified mineral. These particles may be of volcanic and other origins and may be suspended in the upper troposphere and stratosphere. (Author abstract modified)

26081 **APTIC NO. 47387**

Jayaweera, K. O. L. F. and Takeshi Ohtake

ARTIFICIAL CLOUD FORMATION IN THE ATMOSPHERE. *Science, 178(4060): 504-505, Nov. 3, 1972. 3 refs.*

An artificial cloud was formed in a cloudless atmosphere at a temperature below O C by introducing pellets of dry ice into air containing more water vapor than would be present at the saturation point with respect to ice. Such clouds could be utilized to establish equilibrium between ground and air so as to inhibit the cooling of selective arctic surface regions under clear skies and thus prevent the possibilities of an ice fog episode. (Author abstract modified)

26082 **APTIC NO. 47736**

Johnston, Ralph E. and William P. Lowry

COMPUTER MAPS OF LOCAL DISPERSION CLIMATE USING HOURLY WIND SEQUENCES FROM A SINGLE STATION. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 110-113, 1972. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

The shortcomings of a wind rose as an expression of dispersion climate arise principally because information on sequencing of wind behavior, so important in determining trajectories of pollutants, is not present in a wind rose. The concept for a more appropriate climatological statement of dispersion, including information on sequence of comparable directness and simplicity to the wind rose, is presented. The basis and interpretation of the mapping concept are examined, and experimental results are reviewed.

26083 **APTIC NO. 47425**

Kitade, Takeo

ON THE CONVECTION IN A CONDITIONALLY UNSTABLE ATMOSPHERE WITH MEAN VERTICAL MOTION. *J. Meteorol. Soc. Japan, 50(4):243-258, Aug. 1972. 27 refs.*

Convection in a conditionally unstable atmosphere was examined as an eigenvalue problem. The convections were treated as an open system, accounting for air-mass flow through lateral boundaries. Stability properties were studied in connection with the mean vertical motion associated with the air-mass flow. Convection followed by mean upward motion had a smaller lowest Rayleigh number, wider preferred cloud area, and smaller compensating downdraft area, while convection followed by mean downward motion had a larger lowest Rayleigh number and smaller preferred cloud area than closed convection. The energy convection process of convection with mean vertical motion and the heating effect of convection on the large scale field were also studied. (Author abstract modified)

26084 **APTIC NO. 47730**

Knott, K. and G. Schumann

SHORT-PERIOD VARIATIONS OF THE ATMOSPHERIC ELECTRIC POTENTIAL GRADIENT. *Arch. Meteorol. Geophys. Bioklimatol. Ser. A (Vienna), 21(2/3):319-327, 1972. 6 refs.*

The atmospheric electrical potential gradient was measured using a cylindrical filed mill. The ac output signal was continuously recorded, with the time constant at 0.5 sec, to study short-period variations. Four different types of fine structure were determined and are examined in terms of aerosol particle concentrations, space charges, and atmospheric eddy diffusion (turbulence cells). (Author summary modified)

26085 **APTIC NO. 47755**

Mahoney, James R. and Robert M. Patterson

A VARIABLE EMISSION MODEL FOR AIR POLLUTANTS IN THE VICINITY OF URBAN ROADS. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 57-61, 1972. 8 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

A modeling and analysis methodology was developed to evaluate the effectiveness of traffic motion controls in reducing pollutant concentration within congested urban areas. Two special features were incorporated into the model: analysis of emissions related to vehicle speed and operating mode at congested locations and calculation of concentration patterns in the vicinity of peak emission regions. The model was applied to a controlled urban road. A preliminary calculation of carbon monoxide concentration profiles is presented, based on a dispersion model.

26086 **APTIC NO. 47631**

Matsuzaki, Noriyasu, Masaaki Okochi, and Masahiro Udo

USE OF COMPUTER IN ENVIRONMENTAL POLLUTION CONTROL SYSTEM. *(Kankyoosen seigyo shisutemu ni okeru keisanki no oyo). Text in Japanese. Preprint, Automatic Control Assoc. (Japan), p. 395- 396, 1972. 3 refs. (Presented at the Automatic Control Association Joint Lecture Meeting, 15th, Tokyo, Japan, 1972.)*

A computer control system for environmental pollution covering both the mobile and stationary sources must be developed for more effective and comprehensive control of pollution. The computerized system can be used to collect, store, and renew a large magnitude of pollution data, assess effects of local topography, predict diffusion of pollution accurately and speedily, produce and transmit information for necessary control measures, predict and observe effects of the control measures, prepare for timely actions in an emergency, and provide data for reporting and for many other purposes. The system should be such that it can handle both the mobile and stationary sources of air pollution. A suggested mathematical model and input/output relationship is shown in a block diagram. The interactive system for problem solving will include functions of problem definition, simulation, human decision, and problem refinement. A functional flow chart of the interactive system for air pollution control was shown.ution control was shown.

26087 **APTIC NO. 47660**

Matsuzaki, Noriyasu, Masaaki Okochi, and Masahiro Udo

AIR POLLUTION MODEL FOR MOBILE SOURCES OF EMISSION. *(Ido haishutsugen ni taisuru taikiosen moderu). Text in Japanese. Preprint, Automatic Control Assoc. (Japan), p. 393-394, 1972. 4 refs. (Presented at the Automatic Control Association Joint Lecture Meeting 15th, Tokyo, Japan, Nov. 3-5, 1972.)*

A computerized system is being developed for a comprehensive view of air pollution causes and effects as well as for prediction of air pollution control effects. The system includes a traffic emission sub-system, a diffusion sub-system, and a man-machine interface. The first sub-system produces a space distribution of automobile-emitted pollutants from data on road network, automotive traffic, and characteristics of automobiles. The second produces the concentration distribution of air pollutants from the output of the first sub-system and data on stationary sources, taking into account meteorological and topographical conditions. The man-machine interface comprises two units, the monitor and the display. Point (major intersection), line (a part of main road between two major intersections), and area (other medium and small roads in the selected district) are taken as representative of emissions from mobile sources. For all the pollution source unit (point, line, and area), the quantity of the emission is calculated taking into account types of automobiles and drive modes. Input variables are flexible so that user's workload may be alleviated as he is permitted to use as input those variables easy to handle or obtain. When part of the traffic parameters is changed, its effect may be readily checked.

26088 **APTIC NO. 47757**

Miller, Edward L., Ralph E. Johnston, and William P. Lowry

THE CASE OF THE MUDDLED METROMODEL. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 77-82, 1972. 7 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct 31-Nov. 2, 1972.)*

The Myrup urban heat island model was adapted to a digital form and modified to include several important parameters overlooked in the original. The major model parameters in the modified version include net radiation, sensible heat, latent heat, soil heat, diffuse solar radiation, transmissivity, diffusion, stability ratings, wind direction and speed, mixing ceiling, pollutant concentration, temperature, and humidity. The model is essentially a heat balance for a soil-air column containing an earth-atmosphere interface. The heat flux into and out of the soil heat reservoir is the only link between time steps.

26089 **APTIC NO. 47745**

Nappo, Carmen J., Jr.

A NUMERICAL STUDY OF THE URBAN HEAT ISLAND. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 1-4, 1972. 10 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

The sensitivity of the diurnal surface temperature and the urban heat island to variations in surface roughness, surface moisture, and soil thermal diffusivity was investigated. The numerical model, equation parameters, and calculations are presented.

26090 **APTIC NO. 47753**

Oke, T. R., G. B. Maxwell, and D. Yap

COMPARISON OF URBAN/RURAL COOLING RATES AT NIGHT. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 17-21, 1972. 9 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

The growth of the urban heat island was examined in the Montreal and Vancouver areas of Canada. From simple air temperature measurements, the heat island was noted to grow most rapidly following sunset, implying important differences between the cooling of urban and rural environments. A simple cooling rate analysis showed that the rural environment follows a rate compatible with a simple heat transfer theory, but that urban rate is quite different. Preliminary evidence of the energy balances of urban and rural surfaces during this important period of heat island growth is presented.

26091 **APTIC NO. 47733**

Parker, W. J.

CONDENSATION NUCLEI DEPOSITION ON A PLANAR TURBULENCE-FREE INTERFACIAL DIFFUSION LAYER BETWEEN DISSIMILAR GASEOUS PHASES. *Beitr. Physik Atmosphaere, 45(4):347-348, 1972. 1 ref.*

Recent development of a convection-free diffusion cloud chamber, for low temperatures, provides an alternative approach to the development of turbulence-free molecular diffusion mass transfer models at double gas-phase interfaces. Recognition of the existence of these interfaces had previously depended on diffraction and refraction observations. In work using carbon dioxide evolved by sublimation, the interfaces appear to possess electrical charge characteristics which are of sufficient intensity to attract and hold condensation nuclei present in one or both of the gaseous phases. Provision of an atmosphere rich in potential condensation nuclei permits the formation of an easily visible planar turbulence free interfacial diffusion layer between dissimilar gaseous phases, by which the properties of the layer may be more readily studied, as indicative of characteristics possessed by similar systems in nature, and in particular the system of fog dispersal by upward displacement. (Author conclusions modified)

26092 **APTIC NO. 47742**

Raynor, Gilbert S.

URBAN AIR POLLUTION IN A SUBURBAN ENVIRONMENT. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 106-109, 1972. 3 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

The concentration levels of sulfur dioxide in a selected suburban region were documented to describe the spatial and temporal variability in these concentrations and to relate the pattern to meteorological variables and to generalized source regions. Hourly mean SO2 concentrations were measured by impingers; meteorological data included hourly measurements of wind direction and speed, gustiness, temperature, temperature difference, and rainfall. Spatial distribution, annual and diurnal cycles, and effects of wind direction were determined.

26093 **APTIC NO. 47388**

Riehl, Herbert and Dirk Herkhof

SOME ASPECTS OF DENVER AIR POLLUTION METEOROLOGY. *J. Appl. Meteorol., 11(7):1040-1047, Oct. 1972. 12 refs.*

Atmospheric transport equations were evolved for citywide particulate air pollution for Denver. Numerical evaluations are presented for parameters of pollution source and density, wind speed and direction, turbulence, haze coefficient, temperature, altitude, transport, ventilation, heat transfer, pressure, and particulate mass distribution. The role of transport mechanisms in the daily air pollution cycle, and the meteorological conditions associated with the onset and termination of pollution episodes were determined.

26094 **APTIC NO. 47428**

Sawyer, J. S.

MAN-MADE CARBON DIOXIDE AND THE GREENHOUSE EFFECT. *Nature (London), vol. 239:23-26, Sept. 1, 1972. 9 refs.*

Carbon dioxide, water vapor, and ozone influence the transmission of heat through the atmosphere by radiation. Carbon dioxide, a product of the combustion of nearly all fuels, has increased by 0.7 ppm by volume/yr from 1958 to 1968. Carbon dioxide increased from 292 ppm in the 19th century, to 312 ppm in 1958, to 319 ppm in 1969, with annual fluctuations based on its uptake by plants. About 1/2 of the emitted CO2 was removed by natural processes. Natural reservoirs of carbon which take part in the CO2 cycle are the deep sea, the upper mixed layer of the sea, the atmosphere, vegetation, and humus. Only a small proportion of the CO2 entering the sea remains dissolved for exchange with the atmosphere. The remainder forms magnesium and sodium carbonates. An increase of 0.6% in CO2 in the sea corresponds to a 10% increase in the partial pressure of CO2 in the air above. Increased CO2 has an indirect effect on man by absorbing radiation from the Earth s surface, thus radiating less heat in space. This would raise the temperature of the atmosphere, causing more water vapor to be held in the atmosphere, which in turn produces a similar blanketing effect. This Greenhouse Effect has been calculated for a 100% increase in CO2; it would increase the temperature of the world by 1.3 C if the water vapor remained constant and by 2.4 C if the water vapor increased to retain the same relative humidity. An increase of 25% CO2, expected by the end of the century, corresponds to an increase of 0.6 C. However, increased cloudiness from increased water vapor would reflect solar radiation, producing a lowering of temperature, possibly stabilizing the world s temperature or causing an ice age and an extensive of glaciers which would reflect more solar radiation.

26095 **APTIC NO. 47509**

Shaw, N. A.

ACOUSTIC SOUNDING TECHNIQUES FOR MONITORING ATMOSPHERIC STRUCTURES. *In: Radiological Physics Division Annual Report. Environmental Research. January through December 1971. Argonne National Lab., Ill., Radiological Physics Div., Rept. ANL-7860, p. 206-212, 1972. 3 refs.*

An application of sonar principles was used to detect acoustic echoes from small scale turbulent temperature fluctuations in the lower atmosphere of the Chicago area. These irregularities exist within temperature inversions and at the boundaries of air masses of contrasting temperature. The records which are presented graphically illustrate the complexity of the lower atmosphere, particularly those conditions which can lead to severe air pollution episodes. Clearly, twice daily radiosonde probes are insufficient to resolve these changing atmospheric structures, especially the more subtle urban-rural differences. The portable acoustic sounder, together with multiple radiosonde flights, could be employed in an intensive program designed to study the influences of a large city on the lower atmosphere. Experiments are planned for the St. Louis area. Development of the sounder apparatus since it began operating at Argonne is described. (Author abstract modified)

26096 **APTIC NO. 47747**

Spangler, Timothy C. and Richard A. Dirks

MESO-SCALE VARIATIONS OF THE URBAN MIXING LAYER DEPTH. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 37-42, 1972. 11 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

The meso-scale variations of the urban mixing layer depth were studied to examine the magnitude and nature of dynamical influences which may exist at a convective cloud base, thereby effecting convective precipitation. Spatial and temporal variations in the height of a temperature inversion that frequently caps a deep mixing layer were measured. St. Louis was chosen as the study area because of its relatively smooth topography, the lack of any significant large bodies of water nearby, and the existence of a documented precipitation anomaly associated with the city. Data were collected on wind speed and direction, temperature, stability conditions, specific humidity, and topographical influences.

26097 **APTIC NO. 47716**

Spengler, John D. and Narayan R. Gokhale

FREEZING OF FREELY SUSPENDED, SUPERCOOLED WATER DROPS IN A LARGE VERTICAL WIND TUNNEL. *J. Appl. Meteorol., 11(7):1101-1107, Oct. 1972. 15 refs.*

The design and operation of a large vertical wind tunnel are described, together with the associated special photographic equipment and techniques required for studies of the interactions and freezing of freely suspended water drops. During the first two winters of operation several new and important observations were made while freezing freely suspended, large supercooled water drops. The terminal velocity of the frozen pellet was very different than that of the liquid drop. If individual drops freeze at minus 6 C and colder they often exhibit a decrease up to 4 m/sec in terminal velocity. Coalescence of a frozen pellet and a liquid drop produces an elongated ice pellet with a terminal velocity of 9 m/sec. When an ice pellet becomes unstable and spins about a horizontal axis, it can obtain a rapid horizontal velocity. Two ice pellets frozen together display the same erratic tumbling. These observations indicate that some ice pellets have greatly increased distances and residences times to grow in the supercooled region of a cloud. The importance of these phenomena concerns hail growth. (Author abstract modified)

26098 **APTIC NO. 47697**

Stepanov, A. S.

THE KINETIC EQUATION OF PARTICLE DIFFUSIVE GROWTH. *(Kineticheskoe uravnenieye diffuzionnog rosta kapel). Text in Russian. Izv. Nauk SSSR, Fiz. Atmosfery i Okeana, 8(8):853-865, Aug. 1972. 12 refs.*

Non-equilibrium statistical mechanical methods were used to show the evolution of the particle size distribution with time for diffusive growth in heterogeneous systems. From the asymptotic solution of the continuity equation for the N-particle distribution function, a kinetic equation for the one particle distribution function and a formula for the diffusion change of the particle averaged over the whole period were obtained. Heterogeneous and homogeneous particle distributions in space were also investigated.

26099 **APTIC NO. 47641**

Takahashi, K. and T. Tamachi

ATMOSPHERIC AEROSOL PARTICLES MEASUREMENT IN UJI AREA. *(Uji chiku ni okeru taiki earozoru ryushi no sokutei). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(5):72-75, Oct. 1972. 7 refs.*

Aerosol particles were measured in Uji City, Kyoto Prefecture, from July 1971 to March 1972 at a spot more than 2-3 km away from the center of pollution. There was some correlation between particle concentration and wind velocity, but no significant correlation was observed between weather and humidity. The concentration was least before daybreak, rapidly climbing with sunrise, remaining high during the day, and rapidly decreasing with sundown. There was no significant correlation between particle size distribution and humidity. High correlations were observed between the N(0.15) concentration of particles with more than 0.3 micron diameter and the weight concentration, but little effect from humidity was observed. More consideration should be paid to the height of the monitoring spot and the capacity of monitoring equipment, because only insufficient data on the relationship with meteorological conditions could be obtained this time.

26100 **APTIC NO. 47758**

Thayer, Scott D. and Robert C. Koch

SENSITIVITY ANALYSIS OF THE MULTIPLE-SOURCE GAUSSIAN PLUME URBAN DIFFUSION MODEL. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 69-76, 1972. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa. Oct. 31-Nov. 2, 1972.)*

The sensitivity of a multiple-source Gaussian plume urban diffusion model to model input parameters was analyzed. A reasonable range of values of interest were selected for each model input; combinations of values for all input parameters were selected for testing for sensitivity. The parameters tested included changes in spatial variability in emissions; the vertical diffusion parameter; half-life of the pollutant; wind speed; mixing ceiling; and wind direction. The calculations use hourly estimates of meteorological and emission parameters, including atmospheric stability, emission rates, and point source definition. The insensitivity of the model-predicted concentrations to the parameters of the distribution of area source emission heights and wind speed profile parameter values was determined.

26101 **APTIC NO. 47392**

Tien, C. L., D. G. Doornink, and D. A. Rafferty

ATTENUATION OF VISIBLE RADIATION BY CARBON SMOKES. *Combust. Sci. Technol., 6(1/2):55-59, Sept. 1972. 13 refs.*

The attenuation of visible radiation by carbon smokes was analyzed as a function of wavelength and particle size distribution. A single approximate formula that gives an explicit functional relationship among the extinction coefficient and other pertinent physical parameters characterizing smoke clouds was developed. Beam attenuation and extinction efficiency parameters, experimental procedures, numerical data, and results are examined. (Author abstract modified)

26102 **APTIC NO. 47307**

Vadot, L.

AIR POLLUTION PROBLEMS AND POSSIBILITIES OF RELATED LABORATORY STUDIES. *(Les possibilites d etude en laboratoire des problemes de pollution atmospheriques). Text in French. Colloq. Int. Homme, Air Eau, Paris, France, 1972, 8p. (June.)*

Possibilities of laboratory studies on atmospheric pollutant transport and diffusion are reviewed. Atmospheric flow, diffusion, density, and circulation problems are to be solved on the basis of available meteorological and climatological data, of special data on the low layers of the atmosphere, necessary for the determination of diffusion coefficients and atmospheric stability, and of preferably instantaneous values obtained for emission sources and ground layer concentrations. Physical analogous models, using preferably water as the flow medium, entail difficulties in the reproduction of turbulent diffusion phenomena with high degree of geometrical similarity. Modeling on the basis of emission data constitutes a genuine mathematical approach in determining ground layer concentration distributions for all existing emission sources from a diffusion formula to arrive at a resultant concentration distribution. Modeling on the basis of ground-layer concentrations constitutes a method suitable for any site and for any pattern of source distribution, but it can not be applied to the forecasting of future developments. Pollution conditions occurring at short distances from obstacles can be studied on physical analogous models.

26103 **APTIC NO. 47741**

Wagner, Norman K. and Tsann-wang Yu

HEAT ISLAND FORMATION: A NUMERICAL EXPERIMENT. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 83-88, 1972. 11 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

A two-dimensional time-dependent earth-atmosphere boundary layer model was formulated and then solved by finite difference techniques on a digital computer. The model assumed that roughness length, soil conductivity, heat capacity, albedo, and soil moisture can vary with horizontal distance; that the eddy transfer coefficients for momentum and heat are equal to that given by Blackadar s formation; incompressibility for the calculation of vertical motion; and hydrostatic equilibrium for the calculation of the vertical distribution of pressure. Surface temperature was computed from the heat balance equation; upstream differencing was employed on the advective terms; and an implicit time-stepping scheme was used. No constant flux layer was assumed, nor was any functional form assumed for the temperature or wind profiles. The model was used to mathematically simulate heat island formation; mathematical data are presented.

26104 **APTIC NO. 47750**

Wagner, Norman K. and John Peschier, Jr.

TOWER NETWORK FOR URBAN METEOROLOGICAL MEASUREMENTS. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 11-14, 1972. 19 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31- Nov. 2, 1972.)*

Towers originally used for illuminating parts of a city were adapted for use as measurement towers for urban meteorological studies. The towers were instrumented to provide observation of air temperature and wind speed and direction. Five levels on each tower were utilized: 6, 10, 16, 27, and 44 m above street level. Preliminary data analysis is presented to serve as a sample of tower uses.

26105 **APTIC NO. 47739**

Yamada, Tetsuji

URBAN HEAT ISLAND EFFECTS ON AIR POLLUTION. *Preprint, American Meteorological Society, Boston, Mass. and American Inst. of Medical Climatology, Philadelphia, Pa., p. 99-105, 1972. 24 refs. (Presented at the Conference on Urban Environment and Second Conference on Biometeorology, Philadelphia, Pa., Oct. 31-Nov. 2, 1972.)*

The mutual interactions betwen two heat islands and their effects on pollutant concentrations were modeled. An experimental result obtained in a wind tunnel is included for comparison with numerical results. The formulation of the problem is initially based on the assumptions of two-dimensionality and incompressibility of the fluid. Model parameters include transport, temperature, heat diffusivity, wind velocity, pollutant, and source. Formulation of the problem and numerical procedures are examined.

1971

26106 **APTIC NO. 47507**

Ackerman, Bernice and Brian Wormington

SOME FEATURES OF THE URBAN HEAT ISLAND. *In: Radiological Physics Division Annual Report. Environmental Research. January through December 1971. Argonne National Lab., Ill., Radiological Physics Div., Rept. ANL-7860, p. 183-192. 1 ref.*

Climatological records from Chicago Midway Airport and Argonne National Laboratory were used to study variations in the strength of the urban heat island. The average difference between the urban and rural temperatures varied with hour and season; it was largest in summer evenings and smallest in spring and autumn afternoons. The temporal patterns were most pronounced when cloud cover was small and wind speed was low. Although still well defined, the diurnal and seasonal cycles had smaller amplitude with cloudy skies and/or moderate to high winds. Variations in the strength of the urban heat island are due primarily to variations in the urban-rural differentials of radiation and sensible heat flux. Direct heat sources in the city may be significant factors during the winter when insolation is at a minimum. (Author abstract modified)

26107 **APTIC NO. 47614**

Bezuglaya, E. Yu., A. A. Gorchiyev, and Ye. A. Razbegayeva

ANNUAL AND DIURNAL FLUCTUATIONS OF ATMOSPHERIC POLLUTANT CONCENTRATIONS IN URBAN CONDITIONS. *(Godovoy i sutochnyy khod soderzhaniya atmosfernykh primesey v gorodskikh usloviyakh). Text in Russian. Tr. Gl. Geofiz. Observ. (Leningrad), no. 254:152-161, 1971. 13 refs.*

Annual and diurnal fluctuations of the atmospheric pollutant concentrations were determined from systematic monitorings in 50 cities of the USSR during 1968-1969. The soot concentrations were highest during the winter period, and the dust concentrations were largely dependent on the presence of snow or vegetation. The yearly fluctuations of gaseous pollutants such as sulfur dioxide, nitrogen dioxide, and carbon monoxide were of a complex nature due to the differences in the meteorological conditions, and the presence and altitude of industrial emission sources. It was possible to distinguish for different types of the seasonal fluctuations of these gaseous pollutants (spring and fall maxima and winter and summer minima in Baltic cities and over the Northwest European USSR territory, winter and summer maxima the Urals, Western Siberia and the Northeastern European USSR territory, winter maximum and summer minimum over most of Siberia, and summer maximum over most of the European USSR territory). The yearly fluctuations of the SO2 concentrations had the highest amplitudes, followed by NO2 and CO. The relationship between seasonal fluctuations and the frequency of wind speeds of O-1 m/sec was found. The diurnal variations in the SO2 concentrations were most pronounced over the Southern USSR territory. The SO2 concentration were highest in the morning and evening hours during winter, while many Northern and Central European USSR cities had maxima during the day. The concentration variations during summer were less marked, and NO2 had no distinct diurnal fluctuations at all. Two different patterns (maximum during daytime, and small-amplitude fluctuations) in the diurnal CO concentration variations were determined.

26108 **APTIC NO. 47469**

Glonti, T. A. and E. Ye. Kalandarishvili

INTAKE OF NITROGEN, CHLORINE, AND SULFUR WITH ATMOSPHERIC PRECIPITATION AND THEIR LEVEL IN LYSIMETRIC WATERS OF KRASNOZEMS. *(Postupleniye azota, khlora i sery s atmosfernymi osadkami i soderzhaniye ikh v lizimetricheskikh vodakh krasnozemov). Text in Russian. Subtrop. Kult., no. 4:175-179, 1971.*

Nitrogen, chlorine, and sulfur in rainwater and lysimetric (percolation) water samples collected in subtropical western Georgia were determined. The nitrogen supplied by precipitation was mainly in the form of ammonia, while the proportion of nitrates was fairly small. The yearly N supply in two consecutive years was 10.7 kg/ha and 12.2 kg/ha, respectively. The amounts of chlorine and sulfur trioxide in the precipitation were in the respective ranges of 1.40-5.12 mg/l and 0.38-9.2 mg/l, with corresponding yearly supplies of 64.6 kg/ha and 78.7 kg/ha. The high chlorine and SO3 levels were due to the nearness of the Black Sea. Lysimetric investigations revealed that the nitrate, Cl, and S contents in the percolating water are much higher than in the precipitation, and that N leachout occurs in the form of nitrates, primarily during the summer.

26109 **APTIC NO. 47545**

Grant, Lewis O. and Roger F. Reinking

ON AIR POLLUTANTS AS ICE NUCLEI. *Preprint, American Meteorological Society, Boston, Mass., 14p., Jan. 1971. (Presented at the American Meteorological Society Meeting, 51st, San Francisco, Calif., Jan. 1971.)*

Ice nuclei were monitored with a mixing-type chamber and a Bigg-Warner rapid expansion chamber, continuously during the past 17 years at an 11,000 ft elevation in Colorado. Individual observations were made primarily at an activation temperature of minus 20 C. The type of errors possible with a rapid expansion tube chamber are discussed. The average value from an early instrument comparison was 1.3/l with the expansion unit for 241 observations, and 0.94 for the mixing chamber with 836 observations. The high 1955, 1962, 1963, and 1966 averages were related to the cloud seeding activities in the area. No persistent trend in the average concentration of ice nuclei was observed, nor did an increase of pollutants cause any substantial effect in the number of ice nuclei activated at -20 C at this site. The question was considered as to the threshold temperatures for activation of pollutants. Spectra data from activation of auto exhausts indicate that nucleus increases due to exhaust emissions would not be discernable at -20 C, but may play an important role in cloud ice processes for lower temperatures.

26110 **APTIC NO. 47597**

Hamilton, Wayne L. and James E. Miller

HIGH LEAD CONCENTRATIONS IN COLUMBUS SNOW. *Ohio J. Sci., 7(5):313-316, Sept. 1971. 4 refs.*

Lead concentrations in snow collected on the ground within 100 ft of streets and roads in Jan. 1970 were determined by atomic absorption spectrophotometric analysis of dissolved and particulate fractions of impurities. Twenty-seven samples of snow were collected over a 20-square mile, suburban, mainly residential part of Columbus, Ohio. Measured concentrations were between 0.05 and 1.09 ppm Pb, with an average of 0.41 ppm. In all but one sample the lead concentration exceeded the Public Health Service safe limit for drinking water of 0.05 ppm. The temporal and areal distributions of concentrations, together with a comparison with iron concentrations measured in the same samples, indicated that the automobile exhaust was the probable source of the lead. (Author abstract)

26111 **APTIC NO. 47525**

MacDonald, Gordon J. F.

POLLUTION, WEATHER AND CLIMATE. *In: Environment. Resources, Pollution and Society. William W. Murdoch (ed.), Stamford, Conn., Sinauer Associates Inc., 1971, Chapt. 15, p. 326-336. 17 refs.*

Some of the major ways in which man could be altering the planet s climate are reviewed. For example, carbon dioxide added to the atmosphere can bring about a change of several tenths of a degree in the average temperature. Differences between urban and rural climates are considered, for only recently has it been recognized that these climatic differences may affect the behavioral and social attitudes of the urban population. The feelings of alienation and discouragement which are prevalent today in the core of the cities are not independent of the problems of suffocating smog, agitating noise, and the heat of the cities. Climatic fluctuations, sources and thermal effects of carbon dioxide, particles and turbidity of the atmosphere, thermal pollution, albedo, and ocean pollution are discussed.

26112 **APTIC NO. 47473**

Norman, Wendell, Max Kinslow, and J. W. L. Lewis

EXPERIMENTAL STUDY OF SIMULATED HIGH ALTITUDE ROCKET EXHAUST PLUMES. (FINAL REPORT). *Aro Inc., Arnold Air Force Station, Tenn., Arnold Engineering Development Center Contract F40600-71-C-0002, Program Element 62302F, AEDC-TR-71-25, ARO-VKF-TR-7- 258, 176p., July 1971. 18 refs.*

NTIS, DDC: AD 726555

The gas dynamic structure of high altitude rocket plumes was studied in a low density tunnel to obtain basic data on plume size and shape and to determine the extent of the mixing region between the free-stream and rocket gases. The rocket was simulated by specially designed ejectors using helium and carbon dioxide as gases, with conditions chosen to simulate a 100,000-pound-thrust rocket at an altitude of 80 km. Data taken included impact pressure surveys, density measurements of the free-stream and plume gas, temperature measurements, and color photographs. Data will be analyzed and interpreted under a separate study. (Author abstract modified)

26113 **APTIC NO. 47331**

Sakagami, Jiro, Fusako Suzuki, and Giichi Iwata

ON THE CONCENTRATIONS OF MATTER EMITTED FROM A SOURCE IN THE ATMOSPHERE WHEN A FLUX-ZERO LEVEL EXISTS ABOVE THE SOURCE. *Ochanomizu Joshi Daigaku Shizenkagaku Hokoko. (Nat. Sci. Rept., Ochanomizu Univ.), 22(2):153-176, Dec. 1971. 3 refs.*

In the case where there is a level at which the diffusion of matter becomes zero or, in other words, the atmosphere in some sense, is covered with a lid, the concentration of matter emitted from a source in the lower atmosphere would be expected to be higher than the concentration when there is no such level. The relations between the concentration and the height of the level are treated quantitatively with the aid of a computer. (Author introduction modified)

26114 **APTIC NO. 47365**

Sakagami, Jiro

PRACTICAL METHOD FOR ESTIMATION OF GROUND LEVEL CONCENTRATION OF MATTER EMITTED

FROM AN ELEVATED AREAL SOURCE. *Ochanomizu Joshi Daigaku Shizenkagaku Hokoko (Nat. Sci. Rept., Ochanomizu Univ.), 22(2):177-179, Dec. 1971. 2 refs.*

A practical formula is presented for calculating the concentration of matter emitted from elevated areal sources, which is necessary in order to discuss the air pollution problems in urban areas. An example is given in which the formula was utilized to calculate ground level concentrations during both stable and unstable conditions.

26115 **APTIC NO. 47808**

Schreiber, Hermann

TRANSPORT AND SEPARATION OF AEROSOLS. *(Transport und Ausscheidung von Aerosolen). Text in German. Umweltforschung, no. 58:32-34, 1971. (Presented at the Hohenheim University Umweltforschung Seminar, 1971.)*

Atmospheric aerosol studies are reviewed. One cu m of air in the near-surface atmospheric layer contains 2 billion particles with radii smaller than 0.1 micron, 200 million particles with radii in the 0.1-1 micron range, and 200,000 particles more than 1 micron in diameter. The transport of airborne particles is due to exogenous forces, such as electricity, gravity, diffusion, and horizontal and vertical atmospheric motions. Shifts in the fractional composition of atmospheric suspensions toward coarser fractions as a function of residence time in the atmosphere were observed. Trace element investigations of atmospheric particles revealed relationship between particle concentrations and meteorological parameters for the lower layer of the atmosphere. The self-purifying effect of the atmosphere on submicroscopic particles is primarily due to washout and coagulation. The residence time of particles in the atmosphere may range from several days to weeks before separation. Model studies concerning the possible consequences of the increasing atmospheric dust concentration have failed to yield unambiguous results.

26116 **APTIC NO. 47440**

Zrazhevskiy, I. M. and V. V. Klingo

ATMOSPHERIC TURBULENCE MODELING OVER HETEROGENOUS SURFACES. *(K modelirovaniyu atmosfernykh turbulentnykh dvizheniy nad neodnorodnoy nodstilayushchey poverkhnost yu). Text in Russian. Tr. Geofiz. Observ. (Leningrad), no. 254:39-56, 1971. 27 refs.*

A new approach to the determination of similarity criteria for modeling atmospheric turbulence over heterogenous surfaces is suggested. This approach is based on the description of the turbulence by means of Davydov s closed system of equations for mean speeds, secondary and tertiary moments of pulsatory velocities, and for the dissipation flow of turbulent energies, based on the analogy of the dynamics of turbulent motion and of the molecularkinetic theory of ideal gases. Also external energy sources or dissipated incidental forces are considered. It was possible to eliminate Coriolis forces for purposes of modeling atmospheric obstacles. Criteria for Taylor s formula were obtained on the assumption that any combination of similarity criteria constitutes a similarity criterion. The magnitudes involved in the similarity criteria obtained warrant the feasibility of such criteria in modeling atmospheric turbulence in available aerodynamic canals.

1970

26117 **APTIC NO. 47552**

Lettau, Katharina

RADIATION CLIMATE OF NEW DELHI. PART I: SHORTWAVE RADIATION. *Indian J. Meteorol. Geophysics, 21(1):31-42, Jan. 1970. 20 refs.*

A budgetary method to appraise the various shortwave attenuation processes in the atmosphere is described. The method is based on observed global and diffuse radiation from sun and sky, given separately for clear days and all days with average cloud cover. New Delhi was selected as a case study because cloudiness, precipitable water, and aerosol content of the air showed pronounced annual variations. The monsoon period does not produce radical changes in aerosol absorption. More significant is a decrease in the intensity of aerosol scattering. This may be interpreted as a change in particle composition and size distribution. While the monsoon rains remove most of the mineral dust, enough hygroscopic nuclei remain in the air over New Delhi so that attenuation by absorption decreases only slowly after the rains have stopped. (Author abstract modified)

BASIC SCIENCE AND TECHNOLOGY

1972

26118 **APTIC NO. 47656**

Ahn, Chung H. and James W. Gentry

THE EFFECT OF GRAVITATIONAL SETTLING ON THE POLYDISPERSITY OF COAGULATING AEROSOLS. *Ind. Eng. Chem. Fundamentals, 11(4):483-490, Nov. 1972. 32 refs.*

Numerical calculations were developed for an approximate solution of the coagulation equation. The particle distribution was assumed to be closely approximated by a log-normal distribution. The calculations accounted for removal of particles by gravitational settling and included a correction for departure from continuum mechanics for very small particles. The calculations indicated that the standard deviation of the distribution undergoes considerable variation, in contrast to most self-preserving models, and provides a practical method for following changes in the size distribution function during coagulation of aerosols. (Author abstract modified)

26119 **APTIC NO. 47729**

Andrews, Lester and Robert C. Spiker, Jr.

ARGON MATRIX RAMAN AND INFRARED SPECTRA AND VIBRATIONAL ANALYSIS OF OZONE AND THE OXYGEN-18 SUBSTITUTED OZONE MOLECULES. *J. Phys. Chem., 76(22):3208-3213, Oct. 26, 1972. 20 refs.*

Raman spectra of argon matrix-isolated ozone and oxygen-18 enriched ozones were obtained using reduced power argon ion laser excitation. Photodecomposition of ozone was sufficiently moderated to obtain excellent Raman spectra, with the following 16 ozone assignments: v1, 1104/cm, very strong; v2, 701/cm, strong; v3, 1038/cm, weak. Infrared spectra provided complimentary data: v1, 1105/cm, very weak; v2, 704/cm, weak; v3, 1040/cm, very strong. Potential constants were calculated using vibrational fundamentals for six isotopic ozone molecules. An ozone valence angle of 116.3 0 or 4 deg was calculated from four isotopic v3 assignments, in excellent agreement with the microwave value. (Author abstract modified)

26120 **APTIC NO. 47728**

Bonzel, H. P. and R. Ku

MECHANISMS OF THE CATALYTIC CARBON MONOXIDE OXIDATION ON PT(110). *Surface Sci., 36(1):91-106, Oct. 1972. 29 refs.*

The kinetics of the carbon monoxide oxidation on a clean platinum (110) crystal were investigated in an ultra-high vacuum system by utilizing Auger electron spectroscopy, low-energy electron diffraction, and residual gas analysis. Two different catalytic reaction mechanisms existed for the experimental conditions chosen. Between 100 and 220 C where essentially CO was preadsorbed on the Pt surface, the subsequent adsorption of oxygen was competitive and the reaction exhibited the characterists of a Langmuir-Hinshelwood mechanism. In this case the onset of the carbon dioxide formation was delayed by a characteristic time which depended strongly on temperature. A simple model for the Langmuir-Hinshelwood reaction was developed which permitted a more detailed evaluation of the kinetic curves yielding an activation energy for the catalytic reaction of 2.9 kcal/mole. On the other hand, when O2 was preadsorbed on the Pt surface at temperatures greater than 90 C, the subsequent reaction with CO occurred immediately and was temperature independent. This behavior was interpreted in terms of an Eley-Rideal mechanism. Both reactions were used for titration of the adsorbed species. From area measurements under the titration curves it was concluded that the saturation coverage for CO and O2 on Pt(110) is approximately the same. (Author abstract modified)

26121 APTIC NO. 47321

Bosch, Julius

UNIT FOR THE CONTINUOUS DETERMINATION OF THE DUST FLOW IN GAS FLOWS. *(Geraet zum kontinuierlichen Bestimmen des Staubstromes in Gasstroemen). Text in German. Staub, Reinhaltung Luft, 32(11): 436-440, Nov. 1972. 3 refs.*

Paragraph 16 of the Technical Directives for the Maintenance of Clean Air deals with dust emissions. For determination of dust emissions, the dust flow is expressed in kg/hr. A continuously recording meter for the dust flow measurement is described. A sample gas flow is taken isokinetically from the main flow, mixed with dust-free ballast air, and drawn through a stepwise moved filter tape. The mass of the dust layer, increasing anew after each step, is measured with the aid of the beta radiation of krypton(85) and then recorded. By a pneumatic system controlled by the dynamic pressure of the main flow, the sample flow is extracted proportional to the main flow. Therefore, the scale for the extracted mass of dust can be calibrated in units of the discharged amount of dust.

26122 APTIC NO. 47724

Clavenna, L. R. and L. D. Schmidt

DECOMPOSITION OF CO2 ON (100) W. *Surface Sci., 33(1):11-26, Oct. 1972. 25 refs.*

The binding states and condensation kinetics of carbon dioxide and its decomposition products carbon monoxide and oxygen on the high symmetry (100) plane of a tungsten macroscopic single crystal were examined by flash desorption mass spectrometry. The CO2 desorbs almost entirely as CO and oxygen at all coverages. At saturation there are three major states of CO. These correspond to the high temperature states of CO alone although all peaks are shifted and amounts are altered slightly. The CO exhibits four major binding states. All of these obey first order desorption kinetics as expected except the most tightly bound state which obeys second order kinetics. Desorption from a bimolecular complex is postulated to explain these results. Initial sticking coefficients of CO2, CO, and O2 at 300 K are 0.85, 0.49, and 1.0, respectively. Coverage dependences indicate precursor intermediates for the states occupied at low coverages. The initial sticking coefficient of CO2 varies rather slowly with substrate temperature, falling to 0.3 at 1200 K. (Author abstract modified)

26123 APTIC NO. 47420

Dutta, Dilip and D. Landolt

ELECTROCHEMICAL BEHAVIOR OF NITRIC OXIDE IN 4M H2SO4 ON PLATINUM. *J. Electrochem. Soc., 119(10):1320-1325, Oct. 1972. 17 refs.*

The electrochemical reactivity of different nitrogen oxides or their absorption products in sulfuric acid was investigated by potential scan measurements at 23 C with platinum electrodes. Among the substances studied, only nitrous acid and nitric oxide exhibited well-defined oxidation and reduction currents. The electrochemical reactions of NO in 4M H2SO4 were studied in detail using a rotating disk electrode. Mass transport limited currents were observed for both oxidation and reduction. From the variation of the limiting current with rotation rate the diffusion coefficient of NO was determined to be 0.000009 cm sq/sec. (Author abstract modified)

26124 APTIC NO. 47655

Friederich, Rudolf O. and Joseph C. Mullins

ADSORPTION EQUILIBRIA OF BINARY HYDROCARBON MIXTURES ON HOMOGENOUS CARBON BLACK AT 25 C. *Ind. Eng. Chem. Fundamentals, 11(4):439-445, Nov. 1972. 11 refs.*

Experimental adsorption isotherms for binary gas mixtures obtained at constant gas phase composition were used in conjunction with classical surface thermodynamics to determine the composition of the equilibrium adsorbed phase. The adsorption isotherms of mixtures of ethylene-ethane, propylene-propane, and ethane-propane were measured with a commercial vacuum electrobalance at 25.0 C over a pressure range of 10-700 torr. A homogeneous carbon black with a nitrogen surface area of 13 sq m/g was the adsorbent. The adsorption isotherms could be represented by a two-dimensional van der Waals equation of state. The experimental adsorption equilibria of the mixtures agreed with equilibria predicted from the pure component isotherms by an ideal adsorbed solution theory, as well as with predictions based on a two-dimensional adsorbed phase represented by a van der Waals equation of state. (Author abstract modified)

26125 APTIC NO. 47376

Giachardi, D. J. and R. P. Wayne

THE PHOTOLYSIS OF OZONE BY ULTRAVIOLET RADIATION. VI. REACTIONS OF O(1D). *Proc. Roy. Soc. London, Ser. A, 330(1580):131-146, Sept. 26, 1972. 23 refs.*

The reactions of the metastable singlet D state of the oxygen atom with ozone and with oxygen were studied by means of two essentially different techniques. Relative quantum yields for ozone decomposition after photolysis by lambda equals 254 nm radiation were measured by following changes in optical absorption. Relative concentrations of ground state oxygen atoms were measured by means of a resonance fluorescence technique. In both cases, measurements were made in the presence of O2, nitrogen, or helium carrier gases in a flow system, at such time after photolysis that reactions involving the metastable singlet D state and the singlet sigma state were at completion, whereas those involving the ground state of the oxygen atom and the singlet delta state had not proceeded to a significant extent. The intermediate quantum yields for ozone photolysis in helium and oxygen were 1.9 and 1.6, respectively, referred to an assumed intermediate quantum yield for photolysis in nitrogen of 1.0. Both the intermediate quantum yield and the ground state measurements were consistent with the formation of molecular oxygen in the singlet sigma state on 50-60% of quenching collisions between the metastable singlet D state and O2. (Author abstract modified)

26126 APTIC NO. 47723

Holloway, P. H. and J. B. Hudson

THE KINETICS OF THE REACTION BETWEEN OXYGEN AND SULFUR ON A NI(111) SURFACE. *Surface Sci., 33(1):56-68, Oct. 1972. 17 refs.*

When nickel crystals containing dissolved sulfur are heated to temperatures in the vicinity of 750 C, sulfur segregates to the surface. For the cases of the (111) Ni face, this S may form at least two surface structures, having symmetries which are described according to low-energy electron diffraction determinations. Which structure forms in a given case is a function of the immediate past history of the system. Exposure of either of these structures to gas phase oxygen, at temperatures near ambient, results in removal of the S as sulfur dioxide and coverage of the surface with oxygen. The rate of the above reaction is, in all cases, proportional to the gas phase oxygen pressure. The O2 adsorbed when S is removed is immobile, or at least non-reactive, thus the observed reaction involves a mobile, weakly-adsorbed oxygen species. The reaction does not proceed with equal facility at all surface sites. In the case of the one structure, one can describe the observed rate in terms of the nucleation and growth of holes in the S structure. (Author summary modified)

26127 APTIC NO. 47714

Imhof, R. E., F. H. Read, and S. T. Beckett

DETERMINATION OF THE TRANSITION MOMENT OF THE B(1 SIGMA0)- CHI(1 SIGMA+) TRANSITION IN CO. *J. Phys. B, 5(4):896-902, April 1972. 16 refs.*

The lifetimes of the first two vibronic levels of the B(1-Sigma) state of carbon monoxide were measured using the inelastic electron-photon coincidence technique. Their respective values are 21.8 or 0.3 and 15.5 or - 0.7 ns. The measurements depended on the vibrational quantum number of the B state. This dependence could be ascribed either to the predissociation affecting this state or to a dependence of an electronic transition moment on the internuclear distance, or both. Since predissociation was unlikely to be the cause of the variation, the data were used to calculate the dependence on the electronic transition moment of the B-X transition on the internuclear distance in the r centroid approximation. An emission spectrum containing some bands of the associated Hopfield-Birge system was also measured and used in the analysis. (Author abstract modified)

26128 APTIC NO. 47725

Licht, William

THE MOVEMENT OF AEROSOL PARTICLES. *J. Soc. Cosmetic Chemists, 23(10):657-678, Sept. 14, 1972. 11 refs. (Presented at the Society of Cosmetic Chemists, New York, N. Y., Dec. 13, 1971.)*

The movement of an aerosol particle, subsequent to the initial velocity imparted by its source, is governed primarily by the influence of gravity, drag, inertia, diffusion, and electrostatic charges. The combined effect of these forces determines the path a particle follows. If this path brings it sufficiently near to a surface, it may collide with that surface and be deposited thereon. Of special interest here is the possible deposition upon surfaces of the body, the hair, and the respiratory tract. Each of these forces may be characterized by a dimensionless parameter which is readily defined and calculated. From an examination of the numerical values of these parameters, the relative importance of each factor may be judged for a given case. The likelihood of a particle being deposited upon a given source may also be estimated. The critical variables which control the movement are the size and density of the individual particles, its initial velocity, and the velocity of the surrounding air. These may be adjusted, within limits, to promote desired deposition of the particles, or to prevent an unwanted deposition. (Author summary)

26129 APTIC NO. 47339

Moenig, Franz-Josef, Norbert Schwarzer, and Werner Stoeber

DOSING DEVICE FOR THE DILUTION OF CONCENTRATED AEROSOLS. *(Ein Dosiergeraet zur Verduennung von konzentrierten Aerosolen). Text in German. Staub, Reinhaltung Luft, 32(9):361-363, Sept. 1972. 4 refs.*

A dosaging apparatus for the dilution of concentrated aerosols in ratios between 1:60 and 1:800 is described. It is composed of a fork-shaped slide which, controlled by an electromagnet, feeds periodically small fixed volumes of the original aerosol into a continuous flow of clean air by connecting definite bores for the flow of air or aerosol. The electromagnet is controlled by a pulse generator in such a manner that 60, 80, 300, or 420 pipetting/min are possible. The slide stroke time is as short as possible, and the residence time at the end positions is inversely proportional to the operating frequency. The total flow of diluted aerosol does not exceed several l/min. The aerosol particles are subjected to minimual external forces, with minimum particle loss, in the order of magnitude of 1% for a particle size of 5 micron, as a result. Experiments revealed deviations of less than 5% between calculated and measured concentrations.

26130 APTIC NO. 47517

Nicolaon, G., M. Kerker, D. D. Cooke, and E. Matijevic

BROWNIAN COAGULATION IN A SUBMICRON AEROSOL COMPARISON OF EXPERIMENT WITH THEORY. *J. Colloid Interface Sci., 38(2):460-469, Feb. 1972. 20 refs.*

Coagulation of a dibutyl phthalate aerosol consisting of a narrow distribution of submicron spheres was investigated. The aerosol was in Poiseuille flow. Light scattering data were obtained early 0in life history of the aerosol and again after it has undergone coagulation. The size distribution of the initial aerosol was obtained by inversion of the light scattering data, and the size distribution was calculated at later times by numerical solution of Smoluchowski s integrodifferential equation adapted to the Poiseuille flow. The new distribution was then used to calculate light scattering results which were compared with the experimental data. The results were in agreement with Smoluchowski s theory of Brownian coagulation. (Author abstract modified)

26131 APTIC NO. 47313

Sawyer, R. F., W. J. McLean, and C. M. Maes, Jr.

THE PRODUCTION OF NITRIC OXIDE IN AMMONIA OXIDATION FLAMES. *Combust. Sci. Technol., 6(1/2):47-50, Sept. 1972. 3 refs.*

Product compositions for ammonia/oxygen and ammonia/oxygen/nitrogen premixed atmospheric pressure flames were experimentally determined Nitric oxide concentrations in excess of equilibrium levels were observed over the entire experimental equivalence ratio range of 0.40-1.85.(Author abstract modified)

26132 APTIC NO. 47536

Tanaka, Ken-ichi and George Blyholder

PHOTOCATALYTIC REACTION ON ZINC OXIDE. II. OXIDATION OF CARBON MONOXIDE WITH NITROUS OXIDE AND OXYGEN. *J. Phys. Chem., 76(13):1807-1814, June 22, 1972. 18 refs.*

The photocatalytic and thermal catalytic oxidations of carbon monoxide with nitrous oxide and oxygen were studied in zinc oxide. The thermal catalytic reaction of CO with N2O is first order in CO pressure and zero order in N2O pressure. The reaction with N2O is strongly retarded by O2, even though the overall rate of carbon dioxide formation is not changed by the addition of oxygen. The photocatalytic reaction of CO with N2O is not retarded by the addition of O2 and is 0.4 order in N2O and CO pressure. The photocatalytic reaction of CO with O2 is half-order in O2 pressure and zero order in CO pressure. The slow steps of the thermal catalytic reactions of CO with O2 and Co with N2O are the reaction of weakly adsorbed CO with the intermediate species of the negatively charged oxygen ion on interstitial zinc atoms or ions, while under illumination, the slow step of the reaction of CO with O2 is the formation of O species and that of the reaction of CO with N2O in the reaction between N2O and CO on sites produced by illumination. The CO2 retards the reactions of CO with N2O and with O2 in the dark but only slightly retards the reactions under illumination. The reactions were studied by chromatographic analysis (Author abstract modified)

26133 **APTIC NO. 47424**

Vohra, K. G., P. V. N. Nair, and T. S. Muraleedharan

POSSIBLE ROLE OF SINGLET OXYGEN IN AN ION-INDUCED REACTION MECHANISM OF NUCLEUS FORMATION BY SULPHUR DIOXIDE. *Aerosol Sci., 3(4):225-236, July 1972. 33 refs.*

A new mechanism of conversion of small concentrations of sulfur dioxide in the air to sulfuric acid nuclei was investigated. In the reaction, SO2 was first oxidized by singlet excited molecular oxygen, probably the singlet delta state. The products of the reaction were converted to H2SO4 nuclei in the presence of water vapor and ionizing radiation. The method of production of singlet oxygen by photolysis of oxygen and ozone is described. The variation in nucleus formation with varying concentrations of SO2 and singlet oxygen and different values of ionization dose was also studied. Rate constants for SO2 oxidation by singlet oxygen were estimated. The possible role of this mechanism in the atmosphere is discussed. (Author abstract modified)

1971

26134 **APTIC NO. 47454**

Fee D. C. and S. S. Markowitz

SULFUR DIOXIDE AS A RADICAL SCAVENGER IN ALKENE SYSTEMS. *In: Nuclear Chemistry. Annual Report. 1971. California Univ., Lawrence Berkeley Lab., UC-4 Chemistry, TID-4500 (59th Ed.), p. 264-267, 1971. 14 refs.*

NTIS: LBL-666

Hot tritium atoms are produced by (3)helium (n,p)T reactions with 192,000 eV of kinetic energy. They undergo successive energy losing collisions with the molecules or atoms of the gas in which they are made, until they enter the energy range below 20 eV, where a chemical reaction occurs. Carbon-carbon and carbon- hydrogen bond energies are 3 to 4 eV, so any reaction is energetically possible. The vast number of hydrocarbons in the environment has focused attention on the kind of information that can be obtained from recoil tritium chemistry. Many recoil tritium experiments use scavengers to remove thermalized tritium atoms and radical intermediates from the system before such species yield products that might be confused with high-energy tritium reactions. Oxygen, iodine, bromine, deuterated ethylene, nitric oxide, and iodine compounds have been used in gas phase experiments. Oxygen and sulfur dioxide were compared as scavengers for recoil tritium alkene systems. In the tritium plus cyclohexane system, the scavengeable thermal reaction product is cyclohexane-t. Ethylene- t and butadiene-t are high-energy products from the unimolecular decomposition of excited cyclohexene-t. The yields of these products are shown for both O2 and SO2 scavengers. Oxygen and SO2 were also compared in the tritium plus trans-butene system. The yield of butane-t, a product analogous to cyclohexane-t, was sharply reduced by both O2 and SO2 addition. Sulfur dioxide compared favorably with O2 in some alkene systems and was superior in others. The difference in scavenging efficiency can be attributed to the large difference in collisional efficiency between O2 and SO2 for reactions with thermal tritium atoms. While SO2 is not a good scavenger in alkanes, it compares favorably with O2 as a scavenger for alkenes. The use of SO2 may be advantageous in alkenes since O2, the only other scavenger available, shows some anomalous effects in cyclohexane.

EFFECTS-HUMAN HEALTH

1972

26135 **APTIC NO. 47325**

Buechley, Robert W., Wilson B. Riggan, Victor Hasselblad, and John B. Van Bruggen

SO2, NO2, PHOTOCHEMICAL OXIDANT AND PARTICULATE: RELATIONSHIP TO PERTURBATIONS IN MORTALITY. *Preprint, American Medical Assoc., Chicago, Ill., 22p., 1972. 8 refs. (Presented at the Air Pollution Medical Research Conference, Chicago, Ill., Oct. 2-3, 1972.)*

The daily mortality data for 1962-1966 for 422 places in the United States provided a consistent set of mortality predictors. These predictors are of three classes: intrinsic, annual cycle, day of week, and Christmas-New Years holidays; communicable and influenza epidemics; and meteorological, extreme summer heat, cold spells at all seasons, and singular warm or cold days. Of these, annual cycle and extreme summer heat are major predictors, influenza moderate, and the rest minor. Analysis of deaths for the New York-New Jersey metropolitan region for this time period, with the addition of daily sulfur dioxide measurements in Manhattan, showed the pollution measurement to have an independent and significant contribution to the prediction of deaths. The coefficient of haze showed a similar effect. (Author summary modified)

26136 **APTIC NO. 47426**

Chapman, Robert S., Carl M. Shy, John F. Finklea, Dennis E. House, Harvey E. Goldberg, and Carl G. Hayes

CHRONIC RESPIRATORY DISEASE SYMPTOM FREQUENCY IN LATE ADOLESCENCE, IN PARENTS OF SCHOOL CHILDREN AND IN ELDERLY PERSONS. *Preprint, American Medical Assoc., Chicago, Ill., 19p., 1972. 7 refs. (Presented at the Air Pollution Medical Research Conference, Chicago, Ill., Oct. 2-3, 1972.)*

A review is presented for six studies, recently carried out in the United States, relating air pollution exposures to the prevalence of chronic respiratory disease. Five surveys investigated the chronic respiratory effects of sulfur oxides, coupled with varying amounts of total suspended particulates (nitrates and sulfates). These studies were conducted in the Salt Lake Basin, in smelter communities in Idaho and Montana, in the New York Metropolitan Area, and in the Chicago area. The sixth survey, in Chattanooga, Tennessee, investigated the effects of exposure to nitrogen dioxide. The prevalence of chronic bronchites, distributed by study area, air pollution exposure, and smoking habits, is discussed. Additive effects of SO2 and smoking are also mentioned.

26137 **APTIC NO. 47326**

Comstock, George W., Richard W. Stone, Yoshimichi Sakai, Tetsuo Matsuya, and James A. Tonascia

RESPIRATORY FINDINGS AND URBAN LIVING. *Preprint, American Medical Assoc., Chicago, Ill., 12p., 1972. 17 refs. (Presented at the Air Pollution Medical Research Conference, Chicago, Ill., Oct. 2-3, 1972.)*

Respiratory symptoms and smoking histories were ascertained by interviewers in three separate but similar studies among male telephone workers in Japan and the United States. Ventilatory function was assessed, and the participants were also asked to bring in all the sputum they could produce during the first hour after awakening. Geographic location was classified according to birth place, past residence, present residence, and present work location. Regression analysis was utilized to analyze the data. In general, the frequency of respiratory symptoms and the mean sputum volume increased somewhat with age, while the relative forced expiratory volume at 1 sec decreased with age. Evidence of impaired respiratory function was even more closely associated with the number of cigarettes currently smoked. This association was more marked for American than for Japanese subjects. There was no indication of an association of abnormal respiratory findings with urban living at any time of life.

26138 **APTIC NO. 47314**

Davies, C. N.

AN ALGEBRAICAL MODEL FOR THE DEPOSITION OF AEROSOLS IN THE HUMAN RESPIRATORY TRACT DURING STEADY BREATHING. *Aerosol Sci., 3(4):297-306, July 1972. 10 refs. (Presented at the IRCHA Colloque sur les Atmospheres Polluees, 10th, Paris, France, May 3-5, 1972.)*

An equation of conservation or continuity was derived which relates the deposition of homogeneous aerosol in the human respiratory tract during steady breathing to the deposition in the alveolated regions of the lungs; the fraction of aerosol traversing the dead space airways which is deposited in them; the fraction of the aerosol entering the dead space airways during inhalation, but not traversing them, which is deposited in them; and the tidal volume. The equation imposes constraints upon possible values of deposition and alveolar deposition. Further constraints arise if considerations of particle mechanics are used to fix limits for the alveolar deposition. (Author abstract modified)

26139 **APTIC NO. 47615**

Faerber, K.- P. and Irmgard Grosse-Heitmeyer

THE DEVELOPMENT OF RICKETS AND AIR POLLUTION. *(Rachitisentstehung und Luftverunreinigungen). Text in German. Oeffentl. Gesundheitswesen (Stuttgart), 34(9):519-529, 1972. 12 refs.*

Earlier examinations of possible connections between air pollution and the development of rickets in 1957/1958 were repeated under improved and expanded technical monitoring conditions and with the help of extensive medical and sociological surveys from 1965 to 1967. While air pollution in Oberhausen decreased by nearly half, dust precipitation and fine dust in Oberhausen-Osterfeld were still five times as high as in the southern portion of Rees County, the sulfur dioxide nuisance was two to three times and the lead pollution was nine times as high. Solar radiation in Oberhausen was reduced by 13% in the visual range and 16% in the ultraviolet range. Pediatricians observed 459 children born between July 1, 1965 and Sept. 30, 1967. The rickets rate in Oberhausen was 12.85% and 14.52% in Rees. Significant differences in phosphorus and calcium in the blood serum of 267 children were not found. Compared with the 1957/1968 investigations, rickets in Oberhausen decreased by 15.5% and rose by 91% in Rees. Medical and sociological criteria were computed according to the chi square method. All relationships with assured deviation and the results of air measurements and clinical investigations were studied statistically with factor analysis. Reciprocal relationships were found only between occupation of the mother and air pollution. Social factors are apparently a considerable factor in the outbreak of rickets. Vitamin D is needed during pregnancy to protect the child against rickets. Weak relationships were found between air pollution, the extent of radiation absorption, and the frequency and severity of rickets. Since the results did not exclude the possibility of a negative influence of the vapor shroud and thus the diminution of ultraviolet light, a large area examination is needed to clarify this phenomenenon.

26140 **APTIC NO. 47322**

French, Jean G., Gene Lowrimore, William C. Nelson, John F. Finklea, Thomas English, and Marvin Hertz

THE EFFECT OF SULFUR DIOXIDE AND SUSPENDED SULFATES ON ACUTE RESPIRATORY DISEASE IN CHILDREN AND ADULTS IN FOUR AREAS OF THE UNITED STATES. *Preprint, American Medical Assoc., Chicago, Ill., 22p., 1972. 9 refs. (Presented at the Air Pollution Medical Research Conference, Chicago, Ill., Oct. 2-3, 1972.)*

Studies carried out in four distinct geographic areas of the United States (New York City, Chicago, Salt Lake Basin, and Rocky Mountain communities) involving 20,472 children and adults clearly linked excessive acute respiratory disease in those people living in communities heavily polluted with sulfur dioxide and suspended sulfates. Pollution exposure of three years or longer was an important component in contributing to increased risk for acute respiratory disease. Laryngotracheobronchitis was the major reason for an excess of acute respiratory disorders in children in heavily polluted communities in the Salt Lake Basin and Rocky Mountain communities. The effect of pollution on excess acute respiratory disease was independent of socio-economic status and cigarette smoking. (Author summary modified)

26141 **APTIC NO. 47346**

Jansen, G.

MAN S ENVIRONMENT AND ITS INFLUENCING FACTORS. *(Die Umwelt des Menschen und ihre Einflussgroessen). Text in German. VDI (Ver. Deut. Ingr.) Ber., no. 184:11-17, 1972. 20 refs.*

Biological and psychic responses of man to changes occurring in his environment are outlined. Air pollution has a direct influence on the metabolic processes occurring in the human organism. The determination of emission and concentration standards is facilitated by dose-effect relationships, and by the fact that air pollution-related influences on the metabolism are in many cases accessible for measurement.

26142 **APTIC NO. 47429**

King, Barry G., A. F. Schaplowsky, and Edward B. McCabe

OCCUPATIONAL HEALTH AND CHILD LEAD POISONING: MUTUAL INTERESTS AND SPECIAL PROBLEMS. *Am. J. Public Health, 62(8):1056-1059, Aug. 1972. 22 refs. (Presented at the American Public Health Assoc., Annual Meeting, 99th, Minneapolis, Minn., Oct. 12, 1971.)*

There are important differences between occupational lead poisoning and child lead poisoning in the epidemiology, etiology, physiologic response, population at risk, and countermeasures for combating the lead health hazards. But scientific and technical knowledge can be used in both areas. Lead poisoning in children is frequently caused by ingestion of lead from painted surfaces. Lead in food, water, and in the atmosphere contributes to total body intake of both children and adult workers. The principal source of lead in occupational poisoning is atmospheric contamination of the work place. Biologic factors to be considered in protecting children from the adverse effects of lead are discussed. Blood lead determinations are the most reliable and widely accepted tests for determining lead intake; they include dithizone spectrophotometry, atomic absorption spectrophotometry, and anodic stripping voltammetry (a polarographic method). Little concern is evidenced until blood leads in both adults and children reach 80 micrograms/100 ml, since convulsions and other symptoms seldom occur below this level. The enzymatic in vitro activity of aminolevulinic dehydratase (ALAD) is inhibited at very low blood lead concentration. Other evidence of interference with biologic mechanisms in the formation of hemoglobin include increased urinary excretion of ALAD and coproporphyrin, increased protoporphyrin in the red blood cells, and blocking of the entry of iron into the porphyrin. Lead poisoning impairs the central nervous system and can cause mental retardation in children. The daily permissible intake of lead from all sources is 300 micrograms. In industrial workers and children blood lead levels greater than 80 micrograms/100 g blood and 40 micrograms/100 ml blood respectively, are indicative of excessive absorption. The threshold limit value for lead recommended by the International Association of Occupational Health is 0.15 mg/cu m and ranges from 0.2 to 0.02 mg/cu m in different countries.

26143 **APTIC NO. 47479**

Lewis, Trent R., Mary O. Amdur, Martin D. Fritzhand, and Kirby I. Campbell

TOXICOLOGY OF ATMOSPHERIC SULFUR DIOXIDE DECAY PRODUCTS. *Environmental Protection Agency, Research Triangle Park, N. C., Div. of Health Effects Research, EPA Pub. AP-111, 48p., July 1972. 95 refs.*

NTIS: PB 212744

Under certain conditions, sulfur dioxide emitted into the a atmosphere can be converted to sulfuric acid and particulate sulfates. The toxicity of these SO2 decay products and their effects on human health are reviewed. Although sulfuric acid is known to be a much greater irritant than SO2, the combined effect of particle size and concentration of sulfuric acid mist on exposed human subjects is still undetermined. Long and short-term exposure to sulfuric acid is implicated in the etiology of acute and chronic respiratory diseases. Particulate oxidation products of SO2 are also generally more potent irritants than the SO2 gas per se. Other factors that affect the toxicity of particulate oxidation products of SO2, e.g., retention, site of deposition, hygroscopic nature of the products, and the subject s breathing pattern, are discussed. (Author abstract modified)

26144 **APTIC NO. 47635**

Likhacheva, E. I. and F. S. Kuz mina

INTRAHEPATIC HEMODYNAMICS IN PATIENTS WITH CHRONIC SULFUROUS GAS POISONING. *(K voprosu o sostoyanii vnutripechenochnoy gemodinamiki u bol nykh s khronicheskoy intoksikatsiyey sernistym gasom). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, 16(2):15-19, 1972. 10 refs.*

Intrahepatic hemodynamics in 50 31-45-years-old workers of copper melting plants with at least 10 years chronic occupational exposure to sulfur dioxide was investigated. Twelve of the patients showed no clinical symptoms of hepatic lesions, 27 had toxic hepatitis, and 11 had hepatitis with cholecystitis and cholangitis. Other symptoms such as chronic bronchitis and gastritis were detected. The changes observed in the intrahepatic hemodynamics in patients with clinical picture of toxic hepatitis were apparent in 25% of all cases, even in the absence of other manifestations of toxic lesions of the liver. Such rheohepatographic changes are not a reflection of general circulatory insufficiencies, but may be ascribed to the toxic effect of SO2 on the vascular system of the liver.

26145 **APTIC NO. 47384**

McFarland, Ross A.

LOW LEVEL EXPOSURE TO CO AND DRIVING PERFORMANCE. *Preprint, American Medical Assoc., Chicago, Ill., 23p. 1972. 11 refs. (Presented at the Air Pollution Medical Research Conference, Chicago, Ill., Oct. 2-3, 1972.)*

The effects of carbon monoxide on performances related to driving were investigated through laboratory tests of visual and performance functions; tests of actual driving performance were made while subjects operated a specially instrumented automobile on a standard highway. Comparisons were made between performance with O and 17% carboxyhemoglobin, and in some tests, also with 11% COHb. The finding that significantly more visual stimuli located 20 deg away from the center of fixation were not perceived in brief exposures under 17% COHb, along with a progressive increase from the O through 11 to 17% levels, supports the hypothesis that CO adversely affects the likelihood that stimuli in the peripheral field of view will be perceived. Other findings are discussed. (Author summary modified)

26146 **APTIC NO. 47519**

Menzel, Daniel B., Jeffery N. Roehm, and Si Duk Lee

VITAMIN E: THE BIOLOGICAL AND ENVIRONMENTAL ANTIOXIDANT. *Agr. Food Chem., 20(3):481-486, May/June 1972. 32 refs. (Presented at the American Chemical Society, National Meeting, 161st, Los Angeles Calif., March-April 1971.)*

Trace amounts of the air pollutants ozone and nitrogen dioxide rapidly oxidize polyunsaturated fatty acids; phenolic antioxidants retard this oxidation. Vitamin E decreases the acute toxicity of both O3 and NO2. On continuous exposure to 1.5 ppm of O3, the mean lethal time for vitamin E depleted rats was 8.2 days, compared to 18.5 days for continuously supplemented rats. Similarly the LT-50 for depleted rats exposed to 33 ppm of NO2 was 11.1 days vs. 17 days. Exposure to 0.5 ppm O3 also accelerated the depletion of vitamin E from erythrocytes of exposed animals in 23 days versus 36 days for unexposed animals. The polyunsaturated fatty acid content of lung tissue significantly declined in rats fed a constant fatty acid composition diety free of vitamin E and/or exposed to NO2. The O3 exposure decreased the oleic and linoleic acid content but increased the arachidonic acid content. These changes may be complex responses of the lung to increase oxidant stress, as shown by depression of serum reduced glutathione and tissue sulfhydryl compound content, or may be related to other metabolic roles of vitamin E in the biosynthesis of polyunsaturated fatty acids. (Author abstract modified)

26147 **APTIC NO. 47337**

Nelson, William C., John H. Farmer, and John F. Finklea

STATISTICAL APPROACHES TO AIR POLLUTION EPIDEMIOLOGIC STUDIES. *Preprint, American Medical Assoc., Chicago, Ill., 17p., 1972. 10 refs. (Presented at the Air Pollution Medical Research Conference, Chicago, Ill., Oct. 2-3, 1972.)*

To illustrate the analytical approaches used to disentangle multiple effects, one of the recently completed Community Health and Environmental Surveillance System (CHESS) studies is described in some detail. This study involved elderly residents of three metropolitan New York City communities. Such senior citizens, particularly those with heart or lung disease, are believed to be particularly vulnerable to high air pollutant levels. Panelist characteristics, temporal patterns, correlation analyses, stepwise multiple regression analyses, temperature-specific relative risk models, and threshold estimation are discussed. The series of interpretive analyses were able to show that in this study the three pollutants, suspended sulfates, total suspended particulates, and sulfur dioxide, do have a harmful effect on chronic cardiopulmonary disease symptoms of elderly citizens. These analyses indicate that most, if not all, of the adverse effects could be explained by SO2 alone. Air pollutant levels by season are given for SO2. sulfates, nitrates, suspended particulates, and nitrogen dioxide.

26148 **APTIC NO. 47435**

Partsef, D. P., A. R. Chernomorskiy, M. G. Galkina, and B. G. Revich

THE EFFECT OF AIR POLLUTION OF THE STATE OF THE HUMAN RESPIRATORY ORGANS. *(Vliyaniye atmosfernykh zagryazneniy na sostoyaniye organov dykhaniya cheloveka). Text in Russian. Gigiena i Sanit., no. 8:92-94, 1972. 13 refs.*

Materials by foreign researchers on the effects of air pollution on the state of the human respiratory system are reviewed. Increased frequency of acute respiratory diseases, particularly of bronchitis in children, in a nitrogen dioxide-polluted atmosphere was recorded. Acute diseases of the lower parts of the lung are regarded as a more reliable indicator of the effects of air pollution than general respiratory effects. A follow-up study covering children until the age of 15 revealed that infections of the lower respiratory organs are, unlike those of the upper organs, related to the air pollution level. Increased frequency of bronchospactic symptoms, cough, and mucus excretion in children living near industrial or traffic-related pollution sources were determined. Reduction of the maximum rate of expiration is regarded by many as a sensitive indicator of air pollution-generated effects in children.

26149 **APTIC NO. 47401**

Ramade, Francois

MERCURY IS A KILLER. *(Le mercure tue). Text in French. Sci. Prog. Decouverte, 3447(6F):39-47, Sept. 1972. 7 refs.*

Sources of mercury, the cycle of mercury in the ecological system, and related toxicological investigations are reviewed. Organomercury pesticides, industrial wastes, and the combustion of coal and hydrocarbons constitute the principal sources of mercury in the environment. The atmospheric mercury content which never exceeds O.OO25 micrograms/cu m in nonpolluted areas, represents no real danger compared to the mercury levels in aquatic and other biomasses. Metallic mercury vapors, except in high concentration, are of relatively low toxicity. An atmospheric mercury concentration of O.O4 micrograms/cu m in Chicago was measured. Toxicological studies revealed the teratogenic and antimitotic effect of methyl mercury and phenyl mercury in organisms.

26150 **APTIC NO. 47324**

Shy, Carl M., Victor Hasselblad, Robert M. Burton, C. J. Nelson, and Arlan A. Cohen

EFFECTS OF AIR POLLUTION ON VENTILATORY FUNCTION OF U. S. SCHOOL CHILDREN: RESULTS OF STUDIES IN CINCINNATI, CHATTANOOGA AND NEW YORK. *Preprint, American Medical Assoc., Chicago, Ill., 11p., 1972. 7 refs. (Presented at the Air Pollution Medical Research Conference, Chicago, Ill., Oct. 2-3, 1972.)*

The influence of temporal and geographic variations in exposure to suspended particulates, sulfur oxides, and nitrogen oxides, on ventilatory performance of school children, was investigated in Cincinnati, Chattanooga, and New York. Each study was designed to compare elementary school children from neighborhoods of similar socio-economic level in areas of high and low exposure within the same metropolis. The accumulated evidence demonstrates a consistent relationship between exposure to particulates combined with sulfur oxides and impaired ventilatory function in children 5 to 13 years of age.

26151 **APTIC NO. 47409**

Tomita, Kinuko, Toshio Kawaraya, and Kosuke Haruki

STUDIES ON CARBON MONOXIDE EXPOSURE BY AN ANALYSIS OF EXPIRED AIR. *(Kokicho CO nodo karamita CO mansei bakuro no jittai ni kansuru kenkyu). Text in Japanese. Osaka Shiritsu Daigaku Igaku Zasshi (The Journal of the Osaka City Medical Center), 21(4-6);173-186, July 1972. 33 refs.*

Chronic effects of carbon monoxide exposure under urban and occupational conditions were studied by the method of expired air analysis to determine the hazard of automobile exhausts. A survey was made of 168 inhabitants and traffic policemen at main intersections in Osaka which showed a significantly positive correlation between the carboxyhemoglobin saturation in the blood and the CO concentration of the expired air. The regression equation used was Y equals 0.218X 0.140 (r equals 0.937). The CO concentration in the expired air of schoolchildren and inhabitants in the polluted areas was about 1/2 higher than that in relatively nonpolluted control areas. The CO concentration in expired air decreased in the following order: underground parking workers, highway charge collectors, underground tunnel workers, loading and unloading workers, with traffic policeman having the lowest CO concentration.

26152 **APTIC NO. 47414**

Uchiyama, Teruo, Norio Moriaki Tomonori Ishiwatari, Minagawa Tadahisa, and Tadabumi Hagiwara

FUNDAMENTAL STUDIES ON DISTURBANCES OF RESPIRATORY ORGANS BY POLLUTED AIR. (II) EFFECTS OF INHALED OZONE ON LIPIDS IN THE LUNG (II). *(Kokyuki kogai no kisoteki kenkyu (Dai 2 ho) ozon kyunyu no hai-shishitsu ni oyobosu eikyo (sono-2)). Text in Japanese. Nihon Kyobu Shikkan Gakki Zasshi (Japan J. Thoracic Dis.), 10(10):574, Oct. 1972. (Presented at the Japan Thoracic Diseases Society, Annual Meeting, 12th.)*

The effect of oxidants on respiratory organs was studied biochemically, by observing the change of lipids in the lung of rats which inhaled 10-20 ppm ozone for 4 hr. After ozone inhalation the rats (body weight of about 150 g) were killed and their lungs removed. The lung tissues and the washings of airways were extracted. The fractions of lipids, the constitution of fatty acids, and the formation of peroxidized lipids were determined. The formation of lipids was separately determined by the intake of 14 C-palmitic acid into lipids in the lung. The active intake of 14 C-palmitic acid was mainly (95%) into the phospho-lipid; the intake was inhibited about 50% by ozone inhalation of 10 ppm for 4 hr. Ozone changed the constitution of lipids both in the lung tissue and the washings of airway, and especially decreased lecithin. Peroxidated lipids increased by ozone inhalation, especially those of triglycerides, however, in the rats which had been given vitamin B2 butyrate or vitamin E the formation of peroxide was inhibited. Although the effect of ozone on the constitution of fatty acids was not clear in phospholipids, a decrease of palmitic and oleic acids in the triglyceride fraction in the washings of airway occurred. Vitamin B2 butyrate and vitamin E gave an increase of palmitic and a decrease of oleic acid. One of the causes of respiratory organ damage by polluted air was attributed to the change of lipids in the lung. Vitamin B2 butyrate and vitamin E can suppress the action of ozone.

1971

26153 **APTIC NO. 47779**

PROBLEM DESCRIPTIONS FOR SELECTED ENVIRONMENTAL AREAS. *(Problembeschreibungen fuer ausgewaehlte Umweltbereiche). In: Environmental Chemicals and Biocides. (Umweltchemikalien und Biozide). West Germany, Deutscher Bundestag, 1971 (?). p. 92-94. 4 refs. Translated from German. Translation Consultants, Inc., Arlington, Va., 8p.*

Consumption and consumer trends with regard to mercury are discussed, as well as the presence of mercury in the environment and an evaluation of environmental overloads. Mercury concentrations in soil, water, plants, air, fish, and game birds are listed. In addition to the damage to the central nervous system caused by Minamata disease, mercury concentrations of a few mg/kg in food also have teratogenic effects on man and mutagenic effects on various plants and Drosophilia. Mercury as phenylmercuric acetate accumulates primarily in the kidneys in rabbits, where high concentrations can cause proteinuria. Human lymphocyte cultures from persons with increased mercury concentrations in the blood show increased frequency of chromosome breaks. Maximum allowable concentrations at a work area in the Federal Republic of Germany are indicated. Objectives for the improvement of environmental quality are mentioned.

26154 **APTIC NO. 47781**

Apostolov, Iv.

BIOLOGICAL ROLE OF CHROMIUM AND ITS VALUE IN HUMAN NUTRITION. *(Biologichnata rolya na khroma i znacheniyeto mu v khraneneto na choveka). Suvrem. Med., 22(9):35-40, 1971. 61 refs. Translated from*

Bulgarian. Leo Kanner Assoc., Redwood City, Calif., 13p., Sept. 1972.

The distribution of chromium in animals and humans is reviewed, including geographical differences and age changes in human tissue chromium content. In vivo and in vitro experiments pertaining to the metabolic role of chromium are indicated as they pertain to enzymes, nucleic acids, manganese, biological oxidation, the thyroid gland, and interactions with insulin. Changes in experimental animals subjected to a hypochromic diet are described, especially regarding carbohydrate metabolism, fat metabolism, and protein synthesis. Absorption, transport and distribution, and excretion of chromium are discussed. The chromium content in various food products is considered, as well as the role of chromium in human nutrition. The grinding of wheat, sugar refining, chromium mobilization intissues by use of sugar, repeated pregnancy, and sugar diabetes are indicated as factors which may contribute to the suboptimum chromium condition in humans. The effect of the positively charged trivalent chromium ion in children with Kwasiokor, in mature people, in elderly people, and in sugar diabetes patients is discussed.

26155 **APTIC NO. 47556**

Breisacher, Peter

NEUROPSYCHOLOGICAL EFFECTS OF AIR POLLUTION. *Amer. Behav. Sci., 14(6):837-864, July/Aug. 1971. 50 refs.*

The possibility is considered that the physical challenge of air pollution can be simultaneously recognized in changes in our psychological state with concomitant mild or even serious degradation of certain mental or motor functions. The cost in human and productive terms of any detectable damage to our capability to perform at peak efficiency is discussed. Exposures to carbon monoxide in the home, office and traffic are mentioned, and carboxyhemoglobin levels are considered. A short look at some of the more common industrial pollutants is utilized to illustrate their potential physiological effects to workers. Calcium oxides, mercury, chloride, carbon disulfide, asbestos, and oxides of nitrogen are included. The biological reaction to stress is clearly marked by increases in the release of adrenalin, noradrenalin, and aldosterone into the bloodstream, accompanied by higher blood pressure and increased blood supply to cardiac and storated muscles. Olfactory and visual responses to toxic chemicals are discussed, as well as the effect of air pollution on memory, reaction time, manual dexterity, and attention. Design and use of a personal pollution index are described, and planning the air environment a new or rebuilt city is considered.

26156 **APTIC NO. 47618**

Mammarella, L.

BIOLOGICAL AEROSOLS AND MICROAEROSOLS. *(Aerosoli e microaerosoli biologici). Text in Italian. Nuovi Ann. Igiene Microbiol. (Rome), 22(6):369-396, Dec. 1971. 55 refs.*

The behavior of aerosols during aerosol immunization by inhalation, their retention along the respiratory tract, the defense mechanism of the airways against particle penetration, and the various methods of producing aerosols are reviewed. From the nasal cavity to the trachea, to the bronchi, bronchioli, and alveoli, aerosols dispersed in the inspired air, whose flow velocity gradually decreases, are deposited at various levels depending on inertia, duration of stasis, and flow velocity. Particles down to 10 micron in diameter are deposited principally along the nasal cavity, particles between 5 and 10 micron in size are deposited in the retronasal zone and by the large bronchi, and particles smaller than 5 micron penetrate all the way to the pulmonary alveoli. Retention of liquid and solid aerosol particles along the respiratory tract is directly proportional to the second power of the particle diameter with 5 micron particles being retained by 96%, O.5 micron particles by 42%, and O.2 micron particles by 21%. Antibacterial activity designed to maintain sterility in pulmonary cavities has been determined by autoradiographic and other techniques. This defense mechanism is deleteriously affected by certain diseases, by viral infection, silicosis, cortisol, smoking, alcohol, and altitude. The principles of aerosol generating techniques including atomization by jets, nebulization, and atomization by centrifugalization are reviewed.

26157 **APTIC NO. 47807**

Oelschlaeger, Walter

THE EFFECT OF POLLUTANT EMISSIONS ON DOMESTIC ANIMALS. *(Immissionen und ihre Wirkung auf landwirtschaftliche Nutztiere). Text in German. Umweltforschung, no. 58:26-29, 1971. (Presented at the Hohenheim University Umweltforschung Seminar, 1971.)*

General problems of the effects on livestock of various pollutant emissions are reviewed. Livestock damage is mostly due to the ingestion of forage contaminated with toxic substances such as arsenic, chromium, cadmium, molybdenum, copper, fluorine, and lead. Fluorine emission-generated livestock damages in Germany have abated for the last years as a result of the implementation of strict emission standards. Though lead concentrations in plants near highways, especially within the nearest 100-meter strip, are essentially above average, the consumption of such forage by livestock is usually occasional, and hence no damage should be feared. Lack of appetite, diarrhea, loss of weight, sometimes infertility, and reduced milk yield in cows are the nonspecific symptoms of poisoning in livestock. The meat from such animals is usually fit for consumption, while milk lead concentrations may be sometimes too high to be acceptable.

26158 **APTIC NO. 47477**

Schimizzi, Ned V.

LEAD: A HIDDEN FACTOR IN URBAN LEARNING DISABILITIES? Phi Delta Kappan, 1971:192, Nov. 1971. 9 refs.

The amount of lead in the blood of urban dwellers is high enough to interfere with enzyme functions. Most of this lead comes from auto exhausts and from food and beverages. Since 1925, the number of motor vehicles has increased six times; there are now 98 million vehicles polluting the air. Enzyme function is necessary in the complex process of protein synthesis, which in turn is essential to long-term memory. Lead concentrations have been found in the blood of inner city children sufficient to cause biochemical changes, although insufficient to produce symptoms of lead poisoning. Possible relationships between learning problems among urban youths and the effects of airborne lead on learning processed should be studied.

26159 **APTIC NO. 47431**

Secchi, G. C., L. Alessio, and G. Cambiaghi

STUDIES ON ALA-DEHYDRATASE ACTIVITY OF ERYTHROCYTES IN SUBJECTS NOT OCCUPATIONALLY EXPOSED TO LEAD, LIVING IN URBAN AND RURAL AREAS. *(Ricerche sull attivita ALA-deidrasica eritrocitaria di soggetti non esposti a contatto professionale con piombo ed abitanti in zone rurali ed urbane). Text in Italian. Med. Lavoro (Milan), 62(10):435-450, Oct. 1971.*

The aminolevulinic acid-dehydratase activity of erythrocytes was studied in population groups from mountainous or rural areas, urban areas with heavy traffic, and urban areas in the vicinity of lead foundries. None of the subjects examined had ever been occupationally exposed to lead. A strong negative correlation was observed between the concentration of lead in the blood and the ALA-dehydratase activity of the red cells. Higher average levels of erythrocyte ALA-dehydratase activity were found in subjects residing in rural and mountainous areas when compared with subjects living in urban areas; the mean values of enzymatic activity were even more reduced in subjects living in the vicinity of lead foundries. A particularly wide distribution of the ALA-dehydratase and lead blood values was found in the single groups. It seems significant that the lowest average levels of ALA-dehydratase activity were found among the subjects living near lead foundries and in subjects living in a large, highly industrialized city with heavy traffic. However, the existence of low ALA-dehydratase activities in some subjects living in absolutely non-industrialized districts suggests that other sources of contamination, such as food or beverages, might produce in each individual different degrees of lead absorption and consequently different degrees of inhibition of ALA-dehydratase activity, regardless of air pollution.

1970

26160 **APTIC NO. 47763**

Nakagawa, Yozeno and Yasuo Iibuchi

ON THE FOLLOW-UP INVESTIGATION OF MORINAGA MILK ARSENIC POISONING. *(Morinaga, hiso miruku chudokusho tsuiseki chosa ni tsuite). Igakuno Ayumi (Progr. Med.), 74(1):1-3, 1970. Translated from Japanese. Translation Consultants, Inc., Arlington, Va., 9p.*

In the early summer of 1955, a major outbreak of such symptoms as anorexia, anemia, hives, skin pigmentation, diarrhea, vomiting, fever, and abdominal distention occurred among children in all areas of western Japan. The cause for this episode was traced to a mixture of phosphorus, vanadium, and soda containing sodium arsenate which had been added to Morinaga dry milk. Fourteen years after the incident, the records made at the time of the poisoning episode were reexamined, and a general documentary study of arsenic poisoning was conducted. Detailed examinations were also made in response to requests from parents of the injured children. A large of those queried catch cold and sustain infections readily, have inferior academic ability, skin abnormalities, nerve damage, are lethargic, and have delayed physical development.

26161 **APTIC NO. 47596**

Zussman, Bernard M.

TOBACCO SENSITIVITY IN THE ALLERGIC PATIENT. *Ann. Allergy, vol. 28:371-377, Aug. 1970. 10 refs. (Presented at the American College of Allergists, Annual Congress, 26th, Bal Harbour, Fla., March 16, 1970.)*

Tobacco hypersensitivity in atopic patients is a specific type of sensitivity based on an immunological mechanism. The specificity of tobacco as an antigen was confirmed by positive skin reactions to tobacco extract which were of the intermediate type, and by the presence of tobacco reagins in the serum of four patients as shown by passive transfer. Gel diffusion studies further confirmed this specificity. Sixteen patients who had clinical manifestations on exposure to tobacco smoke were investigated for specific tobacco hypersensitivity. Desensitization to tobacco smoke in these patients gave excellent results in 10 patients and fair to good results in six. From a random series of 200 atopic patients, 16% were clinically sensitive on exposure to tobacco smoke which if projected into the allergic population would mean that 8,000,000 people are clinically sensitive to tobacco smoke. (Author conclusions modified)

1969

26162 **APTIC NO. 47772**

Bychenko, B. D. and K. I. Matveyev

PROTECTIVE DOSE OF ANTITOXIN IN EXPERIMENTAL TETANUS. *(Zashchitnaya doza antitoksina pri eksperimental nom stolbnyake). Byul. Eksperim. Biol. i Med., no. 67:72-74, June 1969. 7 refs. Translated from Russian. 5p.*

To protect guinea pigs from experimental tetanus, a mixture of antitetanic sera prepared previously by the Diaferm-2 method was utilized. Onset of disease, the severity of its course, and time of death of the animals were recorded. Data on the infectious dose of the tetanus spores are presented tabularly, as well as information on the dose of antitoxin which protected the guinea pigs from death. The protective antitoxin dose should be higher than 1 IU/g of weight. The higher the dose of antitoxin and the sooner it was administered after infection, the greater the difference between tetanus incubation periods in animals protected with the antitoxin. An antitoxin dose of 0.1 IU/g of animal weight protected appromimately 50% of the guinea pigs from experimental injection.

1966

26163 **APTIC NO. 47767**

Grippaudo, G., F. Valfre, G. Cecchetti, and G. Santacatterina

STUDIES ON VANADIUM AND EXPERIMENTAL CARIES. 1) REVIEW AND COMMENTS ON DATA FROM THE LITERATURE. *(Studi su: Vanadio e carie sperimentale. 1) Rassegna e commento dei dati della letteratura). Ann. Stomatol., vol. 15:87-94, Feb. 1966. 28 refs. Translated from Italian. Leo Kanner Assoc. Redwood City, Calif., 11p., Aug. 1972.*

Before undertaking a study on the relationship between vanadium and experimental caries in the golden hamster, a survey of the literature on this subject was conducted. Concentrations of vanadium in Ascidia, land and sea plants, minerals, animals, and various organs and tissues in man are indicated, in addition to the absorption and retention of vanadium in the body. Experiments carried out by several researchers on caries inhibition effects of vanadium are listed. Authors, year of publication, materials and methodology, and the results obtained are presented.

26164 **APTIC NO. 47769**

Grippaudo, G., G. Santacatterina, G. Cecchetti, and F. Valfre

VANADIUM AND EXPERIMENTAL CARIES. IV. EFFECT OF VANADIUM ON EXPERIMENTAL CARIES IN GOLDEN HAMSTERS. *(Vanadio e carie sperimentale. IV. Effetti del Vanadio sulla carie sperimentale del Golden Hamster). Ann. Stomatol., vol. 15:383-396, May 1966. 17 refs. Translated from Italian. Leo Kanner Assoc. Redwood City, Calif., 16p., Aug. 1972.*

One group of golden hamsters was treated with a normal diet, one with a cariogenic diet, a third with a cariogenic diet and water containing 10 ppm of vanadium, and a fourth group with a cariogenic diet and water containing 20 ppm of V. The percentage frequency of dental caries showed a remarkable reduction in animals to which water containing V had been administered. Possible mechanisms for inhibitive action of V against dental caries are mentioned.

26165 **APTIC NO. 47771**

Kleynrok, Z. Ya. and N. G. Stroykova

THE EFFECT OF VANADYL SULFATE ON HYPERCHOLESTERINEMIA FOLLOWING A SINGLE INJECTION OF CHOLESTEROL. *(Vliyaniye sul fata vanadila na giperkholesterinemiyu, voznikayushchuyu pri odnokratnom vvedenii kholesterina). Byul. Eksperim, Biol. i Med., vol. 61:82-85, March 1966. 14 refs. Translated from Russian. 7p.*

One series of rabbits was administered cholesterol subcutaneously, while a second series received vanadyl sulfate subcutaneously 23 hours after administration of the cholesterol, at a dose of 1 mg/kg. Rabbits of a third series were injected with vanadyl sulfate daily for a period of 5 days, subcutaneously, 1 mg/kg per day, and animals of the fourth series were injected with vanadyl sulfate twice daily with 2.5 mg/kg, for a period of 5 days. Two hours after injection of vanadyl sulfate, at a dose of 1 mg/kg, the cholesterol level was lower than in the control group, with the maximum difference in hypercholesterinemia noted 72 hours after administration of cholesterol. The difference between the test and control groups decreased after 5 days. In the third series of tests, the rate of reduction in blood serum cholesterol slowed down at the end of the observation period in animals receiving vanadyl sulfate, and the cholesterol level in the test series twice that in the control series 240 hours from the time of administration of the cholesterol. In the fourth group of animals, a higher cholesterol level was maintained right up to the end of the experiment in the test group. Depending on the dose and method of administration, vanadyl sulfate can either weaken or intensify nutritive hypercholesterinemia, which is important to remember since an intensification of hypercholesterinemia can lead to aggravation of the course of atherosclerosis.

26166 **APTIC NO. 47768**

Valfre, F., G. Cecchetti, G. Grippaudo, and G. Santacatterina

STUDIES ON VANADIUM AND EXPERIMENTAL CARIES. NOTE III - HEMATIC LEVALS OF VANADIUM ADMINISTERED ORALLY IN GOLDEN HAMSTERS. *(Studio su vanadio e carie sperimentale. Nota III - Livelli ematici de vanadio somministrato per o in golden hamster). Ann. Stomatol., vol. 15:273-283, April 1966. 6 refs. Translated from Italian. Leo Kanner Assoc. Redwood City, Calif., 9p., Aug. 1972.*

The trend of the hematic concentration of vanadium following ingestion by 14 adult male cricei in a single dose and in a water solution was studied. Blood samples were analyzed spectrographically. Different levels of vanadium were added to drinking water given ad libitum to the golden hamsters to try to determine if the relative hematic ratios remain constant in time. The hematic concentration of vanadium was experimentally constant in time, thus confirming the effectiveness of continuous oral administration of vanadium in drinking water. Therefore, vanadium remains in circulation even if the concentration present is very low. The anticariogenic activity of vanadium is due to this continuous availability, whether it controls and catalyzes the action of enzymes that participate in the construction and preservation of the hard tissues, or participates directly in rebuilding these tissues.

1964

26167 **APTIC NO. 47770**

Koval skiy, V. V. and L. T. Rezayeva

THE RESPIRATORY FUNCTION OF A VANADIUM COMPOUND OF BLOOD CELLS OF ASCIDIELLA ASPERSA. *(K voprosu o dykhatel noy funktsii vanadiyevogo soyedineniya kletok krovi Ascidiella aspersa). Zh. Obshch. Biol., 25(5):339-346, Sept.-Oct. 1964. 17 refs. Translated from Russian. 15p.*

Vanadium was combined with an organic compound of unknown composition in Ascidiella aspersa blood cells. The blood cell protein component consists of neutral and positively charged fractions, which are difficult to separate electrophoretically. Upon dialysis of blood cell hemolysate, bonding of vanadium with the undialysable blood cell proteins was not stable. The oxygen and carbon dioxide content of Ascidiella aspersa blood was close to their content in sea water. As with hemoglobin, the vanadium compound in blood cells did not form a labile complex with molecular oxygen. The blood cell vanadium compound was capable of undergoing reversible oxidation and reduction. Vanadium is part of a system which takes part in the blood cell oxidation-reduction processes.

26168 **APTIC NO. 47778**

Roshchin, I. V., A. V. Il nitskaya, L. A. Lutsenko, and L. V. Zhidkova

RESEARCH INTO EFFECTS OF VANADIUM TRIOXIDE DUST ON ORGANISMS. *(Issledovaniye deystviya na organizm pyli trekhokisi vanadiya). Gigiena Truda i Prof. Zabolevaniya, no. 8:25-30, 1964. 7 refs. Translated from Russian. Translation Consultants, Inc., Arlington, Va., 10p.*

An investigation was undertaken to determine the physical properties of vanadium trioxide dust, the mean lethal dose, and the nature of the toxic effect of its aerosol in chronic exposures of rabbits. Experimental research was preceded by an industrial hygiene investigation of the vanadium trioxide content of the air in work areas. Vanadium trioxide is soluble in biological media, and may, in alkali media, partially oxidize into vanadium pentoxide. This compound has a toxicity six times greater than the toxicity of vanadium trioxide. Vanadium trioxide dust is characteristically irritative, and seizures of bronchial asthma were observed in the test animals. Other allergic effects were noted in experimental research and industrial observations.

1963

26169 **APTIC NO. 47774**

Stamatow, St. N.

SEVERAL BIOCLIMATIC QUESTIONS IN CONNECTION WITH AIR POLLUTION. *(Zu einigen bioklimatischen Fragen im Zusammenhang mit Lufverunreinigungen). Angew. Meteorol. (Berlin), 4(8-10):247, Nov. 1963. Translated from German. Translation Consultants, Inc., Arlington, Va., 3p.*

In urban air, the number of light ions is reduced to 100-300/cu cm, whereas the number of heavy ions increases to 10,000-20,000/cu cm. Thus it seems advisable to pay appropriate attention to recreational facilities and resort areas where conditions are favorable for recovery of the respiratory mucous membranes. Advantages of health resorts and how to achieve a healthier climate for persons from large metropolitan areas are mentioned.

1962

26170 **APTIC NO. 47776**

Roshchin, I. V.

HAZARDS OF OCCUPATIONAL VANADIUM INTOXICATIONS IN CLEANING OF BOILERS AT ELECTRIC POWER STATIONS OPERATING CRUDE OIL FUEL AND PROBLEMS OF PROPHYLAXIS. *(Opasnost professional nykh otravleniy vanadiem pri chistke kotlov ehektrostantsiy, rabotayushchikh na neftyanom toplive, i voprosy profilaktiki). Gigiena Truda i Prof. Zabolevaniya, no. 6:17-22, May 1962. 8 refs. Translated from Russian. McGregor and Werner, Inc., Washington, D. C., Mundus Systems, 14p.*

An investigation was made into the chemical composition of the ash in the boiler furnaces of power plants operated on heavy residual oils. Ashes formed during the combustion process usually adhere firmly to the surface of the boiler flue system and are very difficult to remove, consequently presenting a health hazard to those who are engaged in the task of removing the ash particles which may contain vanadium and sulfur compounds. Silicon, calcium, and magnesium oxides also accumulate on the furnace walls and near the intake of the boiler flues. The concentration of dust usually varied from 100 to 500 mg/cu m of air in the breathing area of laborers during surface adhering sediment removal processes. Chronic irritation of the respiratory tract results from the vanadium and probably also the sulfur oxides and sulfuric acid. Control measures discussed include process modifications, protective clothing, and protective masks.

1955

26171 **APTIC NO. 47548**

Stocks, Percy and John M. Campbell

LUNG CANCER DEATH RATES AMONG NON-SMOKERS AND PIPE AND CIGARETTE SMOKERS. AN EVALUATION IN RELATION TO AIR POLLUTION BY BENZPYRENE AND OTHER SUBSTANCES. *Brit. Med. J. (London), vol. 2:923-929, Oct. 15, 1955. 22 refs.*

Death rates from cancer of the lung and bronchus were calculated among men with different smoking habits living in a rural area of Wales, in a mixed area around Chester and Wrexham, and in Liverpool county borough. The death rates were then related to measurements of benzopyrene and other substances present in the air at various places within those areas. The rural death rate increased proportionately to the number of cigarettes smoked per week; pipe smokers as a group ranked with smokers of about 25 cigaretts/week. Liverpool rates exceeded the rural rates in every smoking category, but the urban/rural ratio fell progressively from about nine to one among non-smokers to a small value approaching unity among heavy smokers. The absolute urban excess was much the same in each smoking group, suggesting that an urban factor was added to the effects of smoking. The concentration of smoke and of 3,4-benzopyrene, other polycyclic hydrocarbons, and sulfur dioxide in the air rose with increasing urbanization; the benzopyrene figure in Liverpool was eight to eleven times as great as in the rural localities examined. Benzopyrene might be the agent involved in the urban factor associated with death rates from lung cancer. (Author summary modified)

EFFECTS-PLANTS AND LIVESTOCK

1972

26172 **APTIC NO. 47544**

Cobb, Fields W., Jr., Eugene Zavarin, and John Bergot

EFFECT OF AIR POLLUTION ON THE VOLATILE OIL FROM LEAVES OF PINUS PONDEROSA. *Phytochemistry, 11(5):1815-1818, 1972. 9 refs.*

The composition of the essential oil from the leaves of photochemical air pollution injured and health Pinus ponderosa trees was determined. Methyl chavicol, a product of the carbohydrate-shikimic acid metabolism, was strikingly lower in the injured trees. However, no significant differences were observed in the monoterpenoids. The effects paralleled qualitatively the influence of needle aging on the essential oil composition, i.e., the effect of air pollution represents an accelerated senescence. (Author abstract modified)

26173 **APTIC NO. 47651**

Kadota, Masaya

AIR POLLUTION AND URBAN WOODS - MINIATURE GREEN AREAS AROUND WORKING PLACES. *(Taiki osen to toshi-rin - Shokuba no mawari no mini ryokuchi). Text in Japanese. Rodo no Kagaku (Dig. Sci. Labor), 27(23):77-81, Feb.-March 1972. 12 refs.*

The effectiveness of green areas is examined from the standpoint of psychology, natural sciences, and environmental health. From the environmental hygiene point of view, green areas attenuate the severeness of winter wind, summer dusts, sand, and tide. A green area can act as a noise buffer and as a natural oxygen emission source, and can be effective for diluting and diffusing polluted air on days when the wind is weak and the smog is heavy. It has also been recognized that a green area functions as a dust filtering object. Trees that are strong against sulfur dioxide or oxidant, and therefore suitable for a city green area include camellia or ilex trees or any other that are evergreen and have thick leaves. The design of miniature urban green areas, the methods of maintenance of soil, fertilizing, and protection of trees are discussed.

26174 **APTIC NO. 47707**

Turenkov, N. I. and P. F. Zhigarev

CONTAMINATION OF THE ENVIRONMENT WITH POTASSIUM INDUSTRY WASTES. *(Zagryazneniye okruzhayushchey sredy otkhodami kaliynogo proizvodstva). Text in Russian. Pochvovedenie, no. 9:70-75, Sept. 1972. 11 refs.*

Soil and water samples taken near a potassium processing plant were analyzed, and the effects of gaseous emissions from that plant on the vegetation were studied. Soil samples taken from the upper 0-2-centimeter layer at 1 km distance from the plant contained up to 2.88 mg equivalent of chlorides per 100 g soil, originating from gaseous emissions. The Cl ion concentration in snow water samples taken at 2 km was more than twice the average value for other territories of the USSR. However, the negative effect of the gaseous emissions was most pronounced within a 1-kilometer-radius around the potassium manufacturing plant. The gaseous emissions had toxic and crop-reducing effects on farm plants, primarily on potatoes and apple and cherry trees; oats and couch-grass were relatively resistant to the emissions.

26175 **APTIC NO. 47317**

Unsworth, M. H., P. V. Biscoe, and H. R. Pinckney

STOMATAL RESPONSES TO SULPHUR DIOXIDE. *Nature (London), 239(5373):458-459, Oct. 20, 1972. 10 refs.*

The effect of 1-50 pphm sulfur dioxide on stomatal diffusive resistance of beans and maize was studied with a diffusion porometer. Variation of stomatal diffusive resistance between leaves of the same plant was related to age: the younger leaves had smaller resistances. The effect of SO2 on stomatal diffusive resistance was considerably greater on all leaves of the water stressed plant, implying an undesirable increase in water loss.

1971

26176 **APTIC NO. 47806**

Dinh, Duyen Lai and Guenther Buchloh

THE EFFECT OF FLUORINE EMISSIONS OF POLLEN GERMINATION AND FRUIT GROWTH. *(Wirkung von Fluor-Emissionen auf Pollenkeimung und Fruchtwachstum). Text in German. Umweltforschung, no. 58:24-25, 1971. (Presented at the Hohenheim University Umweltforschung Seminar, 1971.)*

The effects of the fluorides of sodium, hydrogen potassium, magnesium, calcium, and strontium on pollen, helium, and fruit growth were studied. Univalent fluorides except for HF in concentrations of up to 10 ppm had no effect on the pollen germination and on the helium, and even seemed to beneficial for germination. Shrinkage in the apical region and skinny degeneration of the epidermis during fruit growth were observed. Such fruits were of reduced size and of unacceptable quality. These and other findings suggest the pollen growth and germination-inhibiting effect of calcium fluoride.

26177 **APTIC NO. 47478**

Ingersoll, R. B.

SOIL AS A SINK FOR ATMOSPHERIC CARBON MONOXIDE. (FINAL REPORT). *Stanford Research Inst., Menlo Park, Calif., Coordinating Research Council Contract CAPA-4-68 (1-69), and SCU-8799, Environmental Protection Agency Rept. APTD-1307, 45p., Oct. 1971. 30 refs.*

NTIS: PB 205890

Soils and vegetation as a sink for atmospheric carbon monoxide were investigated. Higher plants tested had no detectable capacity for decreasing CO levels. Soils from a wide range of ecotypes depleted CO from atmospheres above them at rates averaging 8.44 mg/hr/sq m of soil surface, indicating that soils could be a major sink for atmospheric CO. The depletion of CO by soils was sensitive to temperature, with a maximum depletion rate at 30 C and a temperature coefficient of 3-6. Soils sterilized by steam, antibiotics, or salt lost the capacity. Anaerobic conditions totally inhibited the process, and there was a slight specificity for a depletion of the lighter isotope of CO. Constant and prolonged exposure of soil to CO reduced the microflora population and the soil s capacity to deplete CO. Among the bacteria and fungi isolated from the soils, 14 fungi possessed the capacity in pure culture to deplete CO. Preliminary experiments with carbon-14 labelled CO indicated that soils oxidize CO to carbon dioxide. (Author summary modified)

26178 **APTIC NO. 47805**

Knoesel, Dieter

THE VEGETATION NEAR ASPHALT PROCESSING AND MIXING PLANTS. *(Vegetation im Bereich von Aufbereitungs- und Mischanlagen fuer den bituminoesen Strassenbau). Text in German. Umweltforschung, no. 58:22-24, 1971. (Presented at the Hohenheim University Umweltforschung Seminar, 1971.)*

Effects of asphalt processing and mixing plant-generated emissions (dust, sulfur dioxide, and bituminous aerosol containing mercaptans) are reviewed. Reduced crops, impaired crop quality, discoloration of crops, and corrugation and necrosis of plant leaves due to SO2 and dust in asphalt processing plant areas were observed. The implementation of strict emission control standards for asphalt processing plants in Germany; the use of centrifugal, tissue and bed filters, electrostatic precipitators, and wet scrubbers, limitation of the maximum allowable dust concentration in waste gases to 150 mg/N cu m; and the use of light, low-sulfur fuel oil and high stacks have had positive effects in terms of reduced plant damages. Investigations so far have failed to give evidence of the phytotoxicity and carcinogenicity of bitumen.

26179 **APTIC NO. 47804**

Michler, Richard

PLANTS AS INDICATORS OF THE ENVIRONMENTAL POLLUTION. *(Pflanzliche Indikatoren der Umweltverschmutzung). Text in German. Umweltforschung, no. 58:19-22, 1971. (Presented at the Hohenheim University Umweltforschung Seminar, 1971.)*

Possibilities of surveying air pollution by means of indicator plants are reviewed. Though the effects of air pollutants such as sulfur dioxide and nitrogen oxides on plants are dependent on several factors such as plant species, stage of development, weather, pollutant concentration, and part of the day, it is possible to use certain plants, especially lichens, as indicators of the degree of air pollution. Comparative observations of vegetation over a period of years, and the exposure of transplanted plants in selected sites represent two different, though complementary, methods for the use of indicator plants.

26180 **APTIC NO. 47792**

Verweij, J. H. P.

MOLYBDENOSIS IN CATTLE BY AIR POLLUTION. *(Molybdeenovermaat bij het rund door luchtverontreiniging). Text in Dutch. Tijdschr. Diergeneesk., 96(22):1508-1515, 1971. 10 refs.*

In 1967, cattle in the pastures surrounding a molybdenum oxide-producing plant showed symptoms suggestive of copper deficiency, that is severe diarrhea, a dull coat, and retarded growth. Discoloration of the hair was very common, and some animals became lame. Blood examination revealed a severe copper deficiency, and analysis of grass and hay showed high concentrations of molybdenum to be present. In June 1967, concentrations of molybdenum were highest south and southwest of the plant, corresponding to the prevailing direction of the wind. From December 1967 to the end of March 1968, concentrations were highest to the east of the plant, since the winds were mainly westerly at the time. The copper-molybdenum quotient of the herbage was a decisive factor in the onset of copper deficiency: when the quotient was greater than four, copper deficiency did not occur; when the quotient was less than three, copper deficiency appeared in every case; between three and four, copper deficiency was a possibility. A positive correlation existed between the molybdenum level of the blood serum and that of the grass ingested. There also was an obvious relationship between the concentration of molybdenum in the feces and that in the grass ingested. The molybdenum level of the urine was markedly higher when the molybdenum intake increased. Treatment consisting of the administration of supplementary copper proved satisfactory.

26181 **APTIC NO. 47761**

Wentzel, K. F.

HABIT CHANGES IN FOREST TREES DUE TO AIR POLLUTION. *(Habitus- Anderung der Waldbaeume durch Luftverunreinigung). Forstarch IV, 42(8-9):165-172, 1971. 12 refs. (Presented at the IUFRO Congress, 15th, Gainesville, Fla., March 1971.) Translated from German. 22p.*

Many years of chronic pollution may cause considerable changes in the needles or foliage and, as time goes on, also in the crown and truck shapes of individual trees as well as entire forest stands. Shearing of crowns by pollutants, diminution of longitudinal growth and truck deformations are discussed, including research near a local zinc foundry shut down 1930 and research results from the Ruhr region. Tree crowns in the vicinity of pollution sources experience asymmetrical deformations, due to a decline in germinative power, primarily on the sides facing the emissions of exhaust gases. Pine stands in the Ruhr Valley have tolerated, for more than 70 years, maximum air pollution levels corresponding to a decline of the longitudinal growth to about one-third of the growth potential, the radial growth to about one-half, and overall productivity to about one-tenth.

1970

26182 **APTIC NO. 47520**

Cameron, J. W., Hunter Johnson, Jr., O. C. Taylor, and H. W. Otto

DIFFERENTIAL SUSCEPTIBILITY OF SWEET CORN HYBRIDS TO FIELD INJURY BY AIR POLLUTION. *HortScience, 5(4):217-219, Aug. 1970. 5 refs.*

Marked differential injury by air pollution to a group of sweet corn hybrids in two experimental field plantings in the Los Angeles Basin occurred in 1969. At Riverside, leaf damage ranged from nearly 0 in 11 hybrids to slight to severe in 23 others. Damage was clearly related to cultivar and was associated with periods of high oxidant levels and high maximum temperatures. There was only a slight relationship between the market maturity date of a cultivar and its degree of damage. (Author abstract)

26183 **APTIC NO. 47760**

Ranft, H. and H. G. Daessler

SMOKE-HARDINESS TEST CARRIED OUT ON WOODS IN AN SO2-CHAMBER TEST. *(Rauchhaertetest an Gehoelzen im SO-2 Kabinenversuch). Flora (Jena), vol. 159:573-588, 1970. 10 refs. Translated from German. 21p.*

From 1967 to 1969, an assortment of approximately 200 varieties of wood plants were exposed to sulfur dioxide in chambers at the Tharandt smoke damage test field, simultaneously with the establishment of wood test areas in the vicinity of three major chemical plants. Leaf and needle sensitivity of the test plants was determined, as well as their regenerative ability at various times during the growing season. Methodology, damage patterns, and regenerative ability are discussed. Results were recorded as a priority classification based on damage of leaves and needles in five groups according to susceptibility, resistance of an assortment of willows, and a sequential list according to regenerative ability.

1969

26184 **APTIC NO. 47385**

Subido, P. S., P. A. Santamaria, E. N. Alqueza, and A. C. Pizarro

PLANTS INJURED BY AIR POLLUTANTS. *Philippine J. Sci. (Manila), 98(3/4):323-328, Sept./Dec. 1969. 5 refs.*

The effects of emissions from a fertilizer factory on the plant life in the surrounding areas were examined. The typical symptoms and condition of the plants affected by corrosive sulfur dioxide and hydrogen fluoride gases included shrivelling, discoloration, and scorched leaves. Branches and twigs were covered with grayish deposits of fertilizer dusts and other particulates. Defoliation was common. The effect on sweet potato was even more devastating; on the average, a field was completely destroyed within three days. Plant growth of varied species was stunted in several cases. The magnitude of destruction was less near the source of pollution and more intense further away, corresponding to the dispersal of pollutants.

1968

26185 **APTIC NO. 47775**

Wentzel, K. F.

THE POLLUTION RESISTANCE OF PLANTS. *(Die Immissionsresistenz der Pflanzen). Baum-Ztg., 2(3):42, 1968. Translated from German. Translation Consultants, Inc., Arlington, Va., 4p.*

Combinations of pollutants and various periods of exposure exist for each plant, the influence of which can cause the plant to wither or die. Just as in any other toxic reaction, the effect depends upon the dosage that interferes with assimilation. Individual plants endure degrees of pollution depending upon type of emission, development phase of the plant, growth conditions, and orographic situation. Criteria for evaluating emission resistance experimentally and in open air are discussed. Lists of plants ranging from the least to the most sensitive apply only to the particular conditions of pollutions, exposure, growth, location, and plant development, for which they were determined.

1967

26186 **APTIC NO. 47764**

Halbwachs, G.

WATER DISTRIBUTION IN SMOKE-DAMAGED WOODY PLANTS. *(Der Wasserhaushalt rauchgeschaedigter Holzgewaechse). Allgem. Forstztg., no. 78:196-197, 1967. 6 refs. Translated from German. Translation Consultants, Inc., Arlington, Va., 6p.*

Since withering symptoms appearing in smoke-damaged spruce and pine are similar to the effects of extreme drought, osmotic coefficients for needles of healthy and smoke-damaged pine stands were determined and the suction capacities in various crown sections were established. Osmotic coefficients were measured by cryoscopy. Investigation of unaffected needles in the field showed that the osmotic coefficients were higher at the extremities than in the basal parts. With smoke damaged needles, necrosis of the extremities eliminates those parts of the tissue at which the highest osmotic values are found, which must necessarily result in an impaired water distribution. Measurements made in normal pine and spruce stands revealed that the suction capacity in a tree increases with increasing height of the branches. However, similar studies of severely damaged samples showed not only changes in absolute suction values but also a greatly deviating distribution of these values at various heights. Smoke emissions primarily affect conifer needles which subsequently are no longer capable of producing the suction force necessary for assuring the water supply beyond a level exceeding a certain height.

1966

26187 **APTIC NO. 47765**

Pelz, E.

DETERMINATION OF SMOKE DAMAGE DEGREE IN SPRUCE STANDS. *(Die Bestimmung des Grades der Rauchschaedigung in Fichtenbestaenden). Soz. Forstwirtsch., 16(6):239-242, 1966. 9 refs. Translated from German. Translation Consultants, Inc., Arlington, Va., 13p.*

With regard to smoke damage, persons concerned with forest management are primarily interested in having a method at their disposal with which to record stages of damage based on largely standardized parameters. The method must be applicable to large areas and feasible for practicing foresters in the field who may not be specially trained in the field of smoke damage. Different methods used for determining the extent of damage of an area and gradations of damage are reviewed. An attempt at classifying degrees of damage in the state forest district of Freiberg is described, as well as experiences in the Tharandt district. The principal basis for a smoke damage evaluation method are those features which are not influenced by the seasonal development of plant life, namely numbers of severely damaged trees in a stand, appearance of symptoms of dying, and effects on stand structure.

1964

26188 **APTIC NO. 47762**

Heege, J. H. ter

POISONING OF CATTLE BY INGESTION OF FUEL OIL SOOT. *(Een intoxicatie bij runderen door opname van stookolieroet). Tijdschr. Diergeneesk., 89(18):1300-1304, 1964. 3 refs. Translated from Dutch. Translation Consultants, Inc., Arlington, Va., 8p.*

Pathological and hematological findings in cattle poisoned by vanadium-contaminated fuel oil soot are described. Jolly's bodies in the erythrocytes, toxic granula in the segmented leukocytes, and nuclei with reddish brown and green stripes; presented a blood picture which pointed to poisoning. Qualitative analysis of urine, blood, and grass samples gave a strongly positive result for vanadium. Further laboratory analysis revealed 2.4 mg V/kg to be present in the liver, 4.3 mg V/kg in the renal cortex, and 4.7 mg V/kg in the renal marrow.

1963

26189 **APTIC NO. 47773**

Lampadius, F.

THE AIR-HYGIENIC SIGNIFICANCE OF THE FOREST AND ITS DEPENDENCE UPON HARMFUL AIR POLLUTION EFFECTS UPON THE FOREST. *(Die lufthygienische Bedeutung des Waldes in ihrer Abhaengigkeit von schaedlichen Raucheinwirkungen auf den Wald). Angew. Meteorol. (Berlin), 4(8-10):248-249, Nov. 1963. Translated from German. Translation Consultants, Inc., Arlington, Va., 7p.*

The presumption that the impact of automobile and other emissions of carbon dioxide upon the air might be considerably reduced by the assimilatory organs of the tree seems questionnable, particularly for the reason that, under normal conditions, the humus decomposition in the forest creates an adequate source for the carbon dioxide requirements of assimilation. It is similarly controversial whether or not air can be purified by absorption of gaseous toxins (such as sulfur dioxide and dust) through the foliage. Active and passive influences of the forest on air purification are distinguished. The condition of the forest edge, the mixture of wood species within the stands, forest arrangement, and especially stand density have a decisive effect upon air filtration and upon the development of air currents. Pollution damaged forests are mentioned, as it is the intention to provide an area survey of the damage existing in the forests of the Germany Democratic Republic.

1962

26190 **APTIC NO. 47766**

Wentzel, Karl Friedrich

FINDINGS RELATING TO SMOKE DAMAGE BASED ON A STUDY OF THE EFFECTS OF DEFECT IN FILTERING AND ABSORPTION EQUIPMENT OF A LEAD SMELTERY. *(Rauchschadenkundliche Lehren der Untersuchung von Wirkungen eines Ausfalles von Filter und Absorptionsanlagen einer Bleihuette). Wiss. Z. Tech. Univ. Dresden, 11(3):581-588, 1962. 23 refs. (Presented at the Working Session of Forestry Experts on Smoke Damage, 3rd Inter., Tharandt, West Germany, May 24-27, 1971.) Translated from German. Translation Consultants, Inc., Arlington, Va., 26p.*

The research methodology of an investigation of smoke damage to forests near a West German lead smelter is discussed. A successful diagnosis of smoke damage to forests is dependent on an effective combination of various diagnostic methods. Proposals for the prevention, or at least a decrease in damages, should be inherent in determining the degree of damage caused by smoke to forests. A historical background to the problem of smoke damage to forests caused by smelting plants is presented, and installations to prevent emissions are considered. Descriptions or photographs of typical symptoms of damage may provide clear indications of acute effects, but they become truly valuable only for assessing smoke damage with regard to range, zoning, and intensity of damage, if they can be brought into correlation with the geography of the territory and local wind frequencies which depend on meteorological conditions. Chemical analysis of leaves, turbidity tests, soil analysis, and analysis of the atmosphere are discussed, in addition to determination of the degree of damage and prophylaxis and therapy.

EFFECTS-MATERIALS

1972

26191 **APTIC NO. 47398**

Abe, Hiroshi, Kanji Narumi, Hiroyuki Kato, and Susuu Takinaga

A STUDY OF ATMOSPHERIC POLLUTION FACTORS BY ANALYSIS OF CORROSION PRODUCTS AND DEPOSITS ON COPPER SPECIMENS. *(Doban hyomen no fushoku seisei butsu, fuchaku butsu no bunseki ni motozuku kankyo osen inshi no kenkyu). Text in Japanese. Boshoku Gijutsu (Corrosion Engineering, Tokyo), 21(10).474:484, Oct. 1972. 9 refs.*

Copper exposed to a polluted atmosphere develops characteristic corrosion products according to the variety of atmospheric corrosion factors. Copper specimens were studied under varying conditions of pollution to define these characteristics. The corrosion factors were grouped by types: basic chloride, basic sulfate, and sulfide. Basic chloride was characteristic in marine areas. basic sulfate or sulfide in industrial areas; rural areas were also tested. An X-ray diffraction peak (7 A) occasionally detected in the corrosion products of copper may be attributed to either hydrated basic copper sulfate or basic copper nitrate.

26192 **APTIC NO. 47399**

Efimov, I. A., B. N. Rybakov, L. A. Knizhenko, G. V. Maslova, and Yu. Ya. Kharitonov

INVESTIGATION OF THE COMPONENTS OF ATMOSPHERIC CORROSION OF ALUMINUM. *(Issledovaniye sostava produktov atmosfernoy korrozii alyuminiya). Text in Russian. Zashch. Metall. (Moscow), 8(5): 580-583, 1972. 14 refs.*

Corrosion products formed on aluminum samples exposed to traces of and O.13 and O.25 mg/cu m-concentrations of sulfur dioxide in a 2-year weathering test were analyzed. The corrosion product was composed of aluminum trihydrate Al(OH)3, alpha-alumina and gamma- alumina as well as small amounts of aluminum sulfate Al2(SO4)3. The acid surface electrolyte formed in the presence of SO2 led to rapid destruction of gamma-alumina with intensified corrosion as a result.

26193 **APTIC NO. 47375**

Lake, G. J.

CORROSIVE ASPECTS OF FATIGUE. PART II: OXIDATIVE EFFECTS. *Rubber Age (New York), 104(10):39-49, Oct. 1972. 78 refs. (Presented at the International Conference on Corrosion Fatigue, Conn., June 1971.)*

Atmospheric oxygen can affect the fatigue behavior of rubber in two ways: either directly through its influence on the crack growth characteristics, or indirectly by causing general deterioration in the form of aging. The major role of oxygen in crack growth and fatigue is discussed, including two possible forms for the action of oxygen. Incorporation of antioxidant in the rubber is considered in terms of behavior of the oxidative component. The concept that the primary strength of the rubber is lower in the presence of oxygen is consistent with the crack growth behavior at low tearing energies. One possible mechanism is that the energy required for bond scission, which was taken to be of the order of the dissociation energy of the single carbon-carbon bond for purely mechanical rupture, is reduced in the presence of oxygen. Aging and the oxygen factor are discussed, as well as the effect of ambient temperatures and swelling. Before crack growth occurs, an induction period is required which decreases with increase of either the stress applied to the sample or the initial cut length. The behavior of rubber in service is outlined, including testing and performance, and improving durability. The strain energy release rate is a means of assessing crack growth behavior. In principle this approach allows laboratory tests to be quantitatively related to service performance. The oxidative effects of ozone are mentioned.

26194 **APTIC NO. 47349**

Strekalov, P. V. and Yu. N. Mikhaylovskiy

INTERACTION OF SO2 WITH THE ADSORPTION LAYER OF MOISTURE DURING ATMOSPHERIC CORROSION OF METALS. *(Vzaimodeystviye SO2 s adsorptsionnymi sloyami vlagi v usloviyakh atmosfernoy korrozii metallov). Text in Russian. Zashch. Metall. (Moscow), 8(5):573-576, 1972. 19 refs.*

The adsorption of sulfur dioxide by adsorption layers of moisture on silver and zinc surfaces, and the corrosive and electrophysical properties of such metal surfaces as affected by SO2 were studied. The adsorption of SO2 was intense only on moisture layers formed from atmospheres with humidities above a critical value (water vapor partial pressure less than 13 torr). The rate of corrosion in a humid atmosphere was proportional to the SO2 concentration. The joint adsorption of water and SO2 caused increased electrical resistivity of the metal layer after an initial reduction of this parameter. The adsorption of SO2 in the outer portion of thick adsorption layers of moisture formed from atmospheres with high humidity leads to the formation of stable crystallohydrate, and to increased ion concentration in the adsorption layer due to the partial ionization of hydrated SO2. The rapid readjustment of the interface layer occurring during the desorption of water molecules from the adsorption layer results in a stable bond of SO2 crystallohydrates, thus advancing corrosion on the metal surface.

26195 **APTIC NO. 47606**

Tajiri, Y.

EFFECT OF AIR POLLUTION ON METALS. *(Taiki osen no kinzoku e no eikyo). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(5):90-99, Oct. 1972. 35 refs.*

Air pollution can dissolve metals chemically, act as a catalyst in a corrosive reaction, corrode electric batteries, cause the adsorption of highly corrosive gases, obstruct uniform diffusion of dissolved gas in a liquid, or lower critical humidity causing dew formation. A combination of these effects can result in corrosion of zinc by sulfuric acid, rusting of iron by salt water, or rusting of metals by soot. Sulfur dioxide can accelerate metal corrosion. Dust can adsorb SO2 and then cause corrosion of metal and formation of water. A rust-proof oil coating is inadequate to prevent corrosion. Sea salt particles can short circuit insulators and cause rusting of metal. Cooling towers, pipes, and heat exchanger metal parts can also become corroded.

1971

26196 **APTIC NO. 47587**

Archer, D. H., D. L. Keairns, J. R. Hamm, R. A. Newby, W. C. Yang, L. M. Handman, and L. Elikan

EVALUATION OF THE FLUIDIZED BED COMBUSTION PROCESS. VOLUME III. APPENDIX M. GAS TURBINE CORROSION, EROSION, AND FOULING. *Westinghouse Research Labs., Pittsburgh Pa., Office of Air Programs Contract CPA 70-9, APTD-1167, 40p., Nov. 1971. 21 refs.*

NTIS: PB 213152

Gas turbine operating experiences are reviewed to determine conditions under which corrosion, erosion, and fouling may occur. The principal parameters in the erosion of turbine blades by a solid particle are the kinetic energy of the particle, the angle of impact, and the physical properties of both materials. Pressurized fluidized bed boiler operation was examined. The ash generated by the unit was not corrosive. Slight deposits were formed on the turbine blade cascade, but the deposits could be easily removed with no signs of erosion. Oil refinery, aircraft, blast furnace, and coal-burning gas turbine experiences correlating dusts and materials deterioration are also described.

26197 **APTIC NO. 47798**

Knabeschuh, Louis Henry, Fred D. Shaw, and Robert David Souffie

VULCANIZABLE OZONE-RESISTANT, BRANCHED ELASTOMERIC POLYMERS. *(Verfahren zur Herstellung von verzweigten elastomeren Polymeren). Text in German. (Du Pont de Nemours (E. I.) and Co., Wilmington, Del.) W. Ger. Pat. Appl. 2,112,945. 23p., March 17, 1971. (13 claims).*

Branched rubbers having a gel content less than 30%, an inherent viscosity equal to or greater than 2.3%, and a Wallace plasticity of 60-100% are prepared by heating a rubber containing 0.1-2 mole carbon:carbon/kg, at a Wallace plasticity of 20-60%, with 0.00125-0.00780 mole sulfur. A sulfur-releasing compound or 0.0005-0.003 mole of an equivalent organic peroxide/100 g rubber can be used instead of the sulfur. Ozone resistant blends would contain 10-50% of this product and 50-90% diene rubber. A mixture of 41 g of this product plus 164 g natural rubber remained crack-free after 24 hours of ozone exposure, while a blend without this product showed extensive cracking after 2-3 hours.

1970

26198 **APTIC NO. 47799**

Latos, Edwin John and Allen Kay Sparks

SYNERGISTIC SUBSTITUTED P-PHENYLENEDIAMINE ANTIOZONANT MIXTURES FOR USE IN RUBBER. *(Synergistisches Antiozonansgemisch und dessen Verwendung in Kautschuk). Text in German. (Universal Oil Products Co., Des Plaines, Ill.) W. Ger. Pat. Appl. 2,045,651. 16p., Sept. 16, 1970. (4 claims).*

The crack resistance of rubber can be improved by addition of 1.5-4% synergistic antioxidant mixture comprising 25-75% N-isopropyl-N-phenyl-p-phenylenediamine and 75-25% N,N-di-C3-10-sec-alyl-p-phenylenediamine. A vulcanized piece of rubber containing 1.75% of such a mixture, when exposed for 48 hours to air containing 30 ppm ozone, showed two cracks compared with a 100 cracks in a piece with no antioxidant.

EFFECTS-ECONOMIC

1972

26199 **APTIC NO. 47360**

AND NOW, HERE'S...THE CANADIAN STEEL INDUSTRY. *33 Mag., 10(10): 36-39, Oct. 1972.*

Overall, the Canadian steel industry ranks number twelve in the world, and produces approximately 1.9% of the total world output. In addition to the six integrated facilities, there are a number of smaller steelmakers operating mini-mills. The heaviest concentration of companies is in Ontario. Perhaps the Canadian steel industry's greatest fear is that of expanding its capacity too fast and running the risk of being in the state of over capacity. The market situation for Canadian steel companies is discussed. The Canadian steel industry is actively engaged in the flight to control pollution. Methods utilized for environmental control at the various companies include fume collectors, electrostatic precipitators, hoods, dust bags, and natural gas use. Pollution control costs for several commercial firms are noted.

26200 **APTIC NO. 47701**

Japan Environmental Agency, Planning and Coordination Bureau

POLLUTION PREVENTION PLANS FOR AREAS NO. 2 AND NO. 3. *(Dainiji chiiki oyobi daisanji chiiki no kogai boshi keikaku ni tsuite). Text in Japanese. 3p., Dec. 1972.*

The target emission standards and the budgets for achieving these targets are presented in tables. The budgets are for the period of 1972 and 1981. The estimated costs for the Tokyo area are $2,766,666,666 for the industry management, $7,833,333,333 for local pollution control agencies, and $966,666,666 for local pollution-related public agencies. For the Kanagawa area, these three figures will be $1,900,000,000, $3,666,666,666, and $566,666,666. For Osaka, these three figures will be $2,533,333,333, $5,400,000,000, and $1,100,000,000, respectively. The total estimated spending for

Area Two (in addition to the above mentioned areas, the Saitama Area River basin, Chiba Edo River basin, Kyoto Yodo River basin, and Nara Yamato River basin), for the same period will be $7,383,333,333, $20,320,000,000, and $2,633,000,000, respectively. The total estimated spending for the period for Area Three (Kashima, Nagoya, Eastern Hyogo Prefecture, Kita-Kyushu, and Oita) will be $8,633,333,333, $23,873,333,333, and $3,143,333,333, respectively. (These figures include budgets for not only air pollution, but also various other forms of public nuisance.)

26201 **APTIC NO. 47732**

Central Council for Pollution Countermeasures (Japan), Planning Committee

A SUMMARY OF A PROGRESS REPORT ON A LONG-TERM VIEW OF ENVIRONMENTAL PROTECTION. *(Kankyo hozen choki bijon chukan hokoku yoshi). Text in Japanese. 49p., 1972 (?).*

Studies were made on environmental destruction factors, changes of conditions, increases in investment, and controlling regulations. A forecast of the long-term impact of environmental control was made using a simulation model based on systems dynamics. In preparing the model, the following factors were taken into consideration: generation of environmental pollutants accompanied by economic growth, elimination of pollution by control investments, the impact of the gap between pollution and desires of the people, the rise of cost accompanied by pollution control investment, and the influence of these factors on gross national product and average income. Taking a standard case based on various parameters plus average figures, it was predicted that if the environmental standards and regulations are made twice as strict as they are now, and if these regulations are enforced immediately, the amount of control investment will be 2.2% of gross national product in 1977 and 3.2% in 1985, and pollution will decline with the peak between 1979 and 1981. If environmental regulations are made stricter and control investments are increased, the controlling of pollution increase can be achieved to a certain extent, for a short term, and the gaps between supply and demand and between imports and exports (balance of trade) can be decreased. However, if the industrial structure and consumption structure remain basically the same, a long term maintenance of an ideal environment will be impossible.

26202 **APTIC NO. 47492**

Wintringham, J. S., A. E. Felt, W. J. Brown, and W. E. Adams

CAR MAINTENANCE EXPENSE IN OWNER SERVICE WITH LEADED AND NONLEADED GASOLINES. *Society of Automotive Engineers, Inc., New York, 16p., 1972. 14 refs. (Presented at the Society of Automotive Engineers National Automobile Engineering Meeting, Detroit, Mich., May 22-26, 1972, Paper 720499.)*

Maintenance expenses when using leaded and nonleaded gasolines were extracted from a 5 year program encompassing over 10 million miles of operation by 64 matched pairs of employee-owned cars. The data were analyzed on a fuel-related basis for those items that might be expected to be affected by the presence or absence of lead antiknocks. Year-by-year cost breakdowns are presented. To provide additional information of car operating costs, total maintenance and tire replacement costs were also evaluated. The use of leaded gasoline resulted in a fuel-related maintenance cost of 0.066 cents/mile more than did the use of nonleaded gasoline; this was equivalent to about 0.85 cents/gal of fuel burned. Engine repair costs were less for leaded fuels than nonleaded fuels. (Author abstract modified)

26203 **APTIC NO. 47580**

Archer, D. H., D. L. Keairns, J. R. Hamm, R. A. Newby, W. C. Yang, L. M. Handman, and L. Elikan

EVALUATION OF THE FLUIDIZED BED COMBUSTION PROCESS. VOLUME III. APPENDIX A. ELECTRIC UTILITY MARKET SURVEY. *Westinghouse Research Labs., Pittsburgh, Pa., Office of Air Programs Contract CPA 70-9, APTD-1167, 56p., Nov. 1971.*

NTIS: PB 213152

The magnitude, characteristics, and requirements of the future utility boiler market were assessed as a guide for determining design parameters in the development of the fluidized bed boiler. The fossil steam market including combined cycles, the availability and cost of fuels, and the economic advantages of alternate sulfur removal systems are examined. Approximately 50% of future annual electric utility generation additions will require boilers of one form or another. The market for fossil steam generation in the United States is expected to show a constant upward trend of 4-5% annual growth rate through 1985, compared with a total electric utility annual growth rate of 7%. The fossil steam segment will grow mainly on the strength of increasing intermediate generation requirements as the fossil base-load market is displaced by nuclear power. Intermediate additions burning coal, natural gas, and oil will represent over 80% of the fossil steam market by 1985. (Author summary modified)

26204 **APTIC NO. 47691**

Lund, Herbert F.

OPERATING COSTS AND PROCEDURES OF INDUSTRIAL AIR POLLUTION CONTROL EQUIPMENT. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 26, p. 26-1 to 26-11.*

The American Institute of Plant Engineers conducted a survey of its membership to determine effectiveness, costs, and improvements needed for air pollution control equipment in manufacturing plants. Capital, installation, and operating costs are presented for the foods, chemicals, rubber and plastics, stone/clay/glass, primary metals, fabricated metals, powered machinery, electrical machinery, professional and scientific instruments, and aerospace manufacturing industries. Unsolved and uncontrolled air pollution problems are listed. By far, improved materials in fabricating equipment was the most recommended improvement. The company staff specialist was scored highest as the most helpful to the plant engineer with air pollution information and solutions, while the federal agencies scored the lowest. State agencies were second, consultants third, plant managers fourth, and city agencies fifth.

26205 **APTIC NO. 47589**

Schwinden, Warren D.

EVALUATION OF THE FLUIDIZED BED COMBUSTION PROCESS. VOLUME III. APPENDIX B. INDUSTRIAL BOILER MARKET SURVEY. *Westinghouse Research Labs., Pittsburgh, Pa., Office of Air Programs Contract CPA 70-9, APTD-1167. 152p., Nov. 1971.*

NTIS: PB 213152

Typical operating parameters for a prototype design of an industrial fluidized bed combustion unit were studied, and the possible areas of application for fluidized bed combustion technology in the industrial boiler market were assessed to estimate the possible influence of fluidized bed combustion technology on the industrial stationary watertube boiler market. The prototype design should be in the 600 psig, 750 F pressure-temperature class. The output of the unit should be the maximum possible while still remaining shipable subject to railroad restrictions. The potential 1980 market for units with outputs exceeding 100,000 lb steam/hr will be about 63.5 million lb of steam. This is the portion of the industrial boiler market which fluidized bed combustion technology will need to penetrate. The overall assessment of the future for fluidized bed combustion technology, based on the survey of fuel usage, is not, however, very optimistic. The use of bituminous coal as a primary fuel in the industrial boiler market is rapidly declining, and the domain of fluidized bed combustion marketability is further restricted by the use of gas as a primary fuel in the regions consuming the largest average unit size. However, since coal fired units will always have some area of application in the industrial boiler market, fluidized bed combustion is a useful technological advancement. (Author conclusions modified)

26206 **APTIC NO. 47809**

Werner, Josua

ECONOMIC ASPECTS OF ENVIRONMENTAL PROTECTION. *(Volkswirtschaftliche Aspekte des Umweltschutzes). Text in German. Umweltforschung, no. 58:74-77, 1971. (Presented at the Hohenheim University Umweltforschung Seminar, 1971.)*

General economic aspects of environmental protection are outlined. While the social costs of environmental pollution can not always be quantified and broken down, originators of pollution should be identified whenever possible, and be required by law to eliminate pollution, or to pay commensurate fines. The costs of technological and other measures taken for pollution abatement are passed on to consumers who in addition should pay taxes for the financing of global environmental protection projects. All this amounts to an ever increasing proportion of the gross social product being chipped off for environmental protection purposes in industrialized countries.

STANDARDS AND CRITERIA

1972

26207 **APTIC NO. 47312**

Sommer

QUALITY CRITERIA OF THE ENVIRONMENTAL AIR. *(Critere de qualite de l air ambiant). Text in French. Colloq. Int. Homme, Air Eau, Paris, France 1972, 7p. (June.)*

General problems of establishing equality criteria and standards for the environmental air are described. The difficulties involved in the setting up pollution standards are due to the heterogenous character of the populations concerned, the synergism of several pollutants, and to specific meteorological and climatic factors. Air quality criteria can be derived from acute and chronic cases of high pollution levels, and particularly from epidemiological surveys, especially regarding such manifestations as the intensification of certain symptoms like cough and expectoration, increased frequency of bronchial and pulmonary diseases in children, impairment of the respiratory function, increased frequency of asthma, and nasal or ocular irritations. Air quality criteria and standards for particulates, sulfur dioxide, carbon monoxide, nitrogen dioxide, and oxidants adopted in the U.S.A., the USSR, West Germany and France are presented with special regard to the divergences between such quality criteria and legal standards. International unification of air quality criteria established on the basis of standardized epidemiological surveys is regarded as a real possibility, while such a unification of legally imposed pollution standards is largely impeded by specific economic, geographic, and climatic factors.

1971

26208 **APTIC NO. 47672**

Stern, Arthur C.

AIR AND WATER POLLUTION QUALITY STANDARDS. PART 1: AIR POLLUTION STANDARDS. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 4, p. 4-1 to 4-22.*

In general an air quality standard is developed by formally or informally considering air quality criteria, which are compilations of effects associated with various concentrations and durations of exposure of pollutants, plus other factors, such as cost and technological feasibility of emission control, and social questions. The Clean Air Act and the process involved in the adoption of air quality standards in the United States are outlined. Development and features of the air quality standards in the Soviet Union, Poland, West Germany, and other countries are indicated. State air quality standards are given for carbon monoxide, ethylene, fluorides, hydrogen sulfide, nitrogen dioxide, oxides of nitrogen, oxidants, sulfur dioxide, beryllium, calcium oxide, lead, sulfates, sulfuric acid, and suspended particulate matter. Standards which attribute to a source, and limit the emission from the source on this basis, are emission standards. The promulgation and features of the emission standards in the United States, Great Britain, the Federal Republic of Germany, Japan, and other countries are presented. Tables of both emission and air quality standards are included. Stack height and fuel standards are mentioned.

LEGAL AND ADMINISTRATIVE

1972

26209 **APTIC NO. 47634**

Hyogo Prefectural Environmental Science Inst. (Japan)

WHITE PAPER ON PUBLIC NUISANCE, 1972. *(Kogai hakusho, showa 47 nendo ban). Text in Japanese. 479p., 1972.*

Measurements of sulfur oxides and particulates in 1971 revealed that the yearly average concentrations in five divided areas had the tendency of decreasing, compared to the previous year. In Amagasaki city, the SO2 concentration decreased from 1.59 mg/day/100 sq cm to 1.28 mg/day/100 sq cm, and in Kobe city, it decreased from 1.17 mg/day/100 sq cm to 0.86 mg/day/100 sq cm. The average monthly concentration of oxidants ranged from 0.014 ppm to 0.034 ppm in different areas, and that of nitrogen dioxide ranged from 0.023 ppm to 0.036 ppm. There were 3601 complaints filed during the year, among them, 888 complaints were air pollution related. The air pollution monitoring system has been strengthened by increasing measuring instruments for pollutants and weather conditions.

26210 **APTIC NO. 47698**

Japan Environmental Agency, Planning and Coordination Bureau

APPROVAL OF POLLUTION PREVENTION PROGRAMS FOR AREAS NO. 2 AND NO. 3. *(Dainiji chiiki oyobi daisanji chiiki no kogai boshi keikaku no shonin ni tsuite). Text in Japanese. 2p., Dec. 19, 1972.*

The public nuisance control plans for Areas two and three are based on the environmental standards. However, for sulfur oxides, for instance, each locality is planning to enforce the achievement of the present standards by 1973 or 1974. Tokyo and Osaka are trying to meet more severe environmental standards, and the other cities are waiting for the revision of the present environmental standards. To achieve the standards, the management of industries will promote desulfurization of fuel oils and stack gases, installations of dust collectors, drainage, and various other public nuisance prevention systems. Local public organizations will promote remodeling of public sewage, rivers, and ports, and installation of conduits, green buffer areas, waste disposal facilities, and various other public facilities. These are the general guidelines for pollution control measure enforcement, but in realizing these plans, each local public organization will need thorough counseling and communication with the related government agencies, depending on the particular conditions of each area.

26211 **APTIC NO. 47699**

Central Council for Pollution Countermeasures (Japan), Planning Committee

A PROGRESS REPORT ON METHODS FOR POLLUTION PREVENTION REENFORCEMENT IN SPECIAL POLLUTION ALERT AREAS. *(Tokutei chiiki ni okeru kogai no mizen boshi no tettei no hosaku ni tsuite no chukan hokoku). Text in Japanese. 16p., Dec. 1972.*

Examinations of the past trends in developing industrial areas, plans for the future enforcement of pollution prevention in developing industrial areas, the use of lands, and proposals for prevention of environmental pollution in specific areas are discussed in this progress report. The World Health Organization s Guide to Air Quality in four levels are itemized. In selecting and developing a new industrial area, collectivization has been the keynote in the recent past; this has caused many air pollution problems. Future planning should be toward industrial parks with green areas and parking spaces. The residential areas for the workers should be away from the production area; sewage works, waste treatment facilities, recreation areas, and other necessary living environments should be planned and constructed simultaneously. Industries must select their own production processes, scales, and pollution prevention facilities in order to maintain the area s environmental standard. In the past, there was a grave inbalance of investments for production facilities and pollution prevention facilities; there was also a serious lag between private investment and allocation of social or public funds, which contributed toward the public nuisance problem.

26212 **APTIC NO. 47700**

Japan Environmental Agency, Planning and Coordination Bureau

POLLUTION PREVENTION PROGRAMS (AREA NO. 2 AND AREA NO. 3). REFERENCE DATA. *(Kogai boshi keikaku (Dai 2-ji chiiki, dai 3-ji chiiki) ni tsuite). (Sanko shiryo). Text in Japanese. 7p., Dec. 1972.*

Area Two comprises Tokyo, Kanagawa, Osaka, Saitama, Chiba, Kyoto, and Nara; Area Three comprises Kashima, Nagoya, Eastern Hyogo, Kitakyushu, and Oita. In these areas, the present sulfur oxide emissions, estimated amount in 1976, the target goals for 1980, and the methods of reductions are presented in tables. The present emission in the Tokyo area (1971) is 90,000 t/yr which will increase to 105,000 tons in 1976, and 127,000 in 1980. The target SOx emission for 1980 is 45,000 tons, or a reduction by 82,000 tons. In Kanagawa, the present emission is 208,000 tons, and the estimated figure for 1976 is 303,000 tons, and the target goal is 131,000 t/yr. For the Osaka area, the present emission is 374,000 tons, the estimated amount for 1976 is 502,000, and 632,000 tons for 1981. The target for 1976 is 183,000 tons, and for 1981, 91,000 tons. These goals are to be achieved by desulfurization of fuel oil, by changing fuel types, by installation of desulfurization systems for stack gases and dust collectors, and collectivization of the area s heating and cooling systems. These methods will apply also to the cities and districts in Area Three, except for the last method. Data is also given on dust, nitrogen dioxide, and water pollution.

26213 **APTIC NO. 47718**

Nomura General Research Inst. (Japan)

APPROACH TO PUBLIC NUISANCE FREE ECOSYSTEM. (A SUMMARY). *(Datsu-kogai keizai shisutemu e no sekkin). Text in Japanese. 57p., Dec. 1972.*

A technical study for the development of an ecological system, free of pollution was conducted by a commission. The basic data includes a rough draft for a ecosystem simulation model, studies of industrial waste emission conditions, emission quantities and geographical distribution of industrial pollutants, studies on treatment techniques and treatment costs, conditions and problems in waste recycling, and case studies of paper-pulp industries as an example for the future pollutionless industrial system.

26214 **APTIC NO. 47719**

Japan Political Science Research Inst.

APPROACH TO ECOLOGY SYSTEM FOR THE HARMONIOUS DEVELOPMENT OF INDUSTRIAL ACTIVITIES WITH NATURE. (A SUMMARY). *(Sangyo katsudo to shizen to no chowa no tame no ekoroji shisutemu e no sekkin). Text in Japanese. 20p., Dec. 1972.*

The basic characteristics of industrialization and the attendant problems, and the need for securing environmental standards prompted research for the reconciliation of industrialization and environmental protection. The formation of a general master plan was suggested which would be the basis of large-scale projects for recreating an adequate living environment for human beings including projects for large scale parks and green areas, beautiful rivers and seacoasts. Before industrialization of an area, a site diagnosis should be conducted using the natural living matters as indexes, and the development plan should be made from the standpoint of preserving variety of the areas natural wealth and resources.

26215 **APTIC NO. 47734**

Ube Municipal Government (Japan), Dept. of Public Nuisance

PUBLIC NUISANCE IN UBE CITY (MARCH 1972). *(Ube-shi no kogai). Text in Japanese. 34p., 1972.*

The percentages of complaints made against public nuisance in Ube city between 1967 and 1970 against soot increased from 6.7% to 20% between 1967 and 1969, decreased to 8.7% in 1969, and increased again to 13% in 1970. Dust complaints were 20% in 1967 and 1968, 13% in 1969, and 8.7% in 1970. Bad odor complaints were 13% in 1967 and 1969, 4% in 1968, and 20.3% in 1970. Complaints against noise and vibration nuisances were relatively high throughout these years. Twelve air pollutant emission sources with more than 10 N cu m/hr sulfur dioxide emitted are scattered along the coast. Settling particles have been measured by deposit gauges since May 1950; and sulfur oxides have been measured by the lead peroxide method since April 1970 at 26 monitoring stations. Chemical analyses are conducted by the Yamaguchi University School of Medicine. Sulfur oxides measurements are continuously taken by the electroconductivity method at one National, six Prefectural, and two Municipal monitoring stations; the measurements at four of these stations are transmitted by telemeter to the central monitoring station. Sulfur dioxide is the main pollutant; as of 1970, 0.51 mg/10 sq cm/day was the average concentration. Westerly wind in the spring and summer seems to bring heavy pollution, especially when the wind velocity is more than 5 6 m/sec.

26216 **APTIC NO. 47740**

Tokyo Metropolitan Government (Japan), Bureau of Environmental Protection

AN OUTLINE FOR COUNTERMEASURE OPERATIONS FOR TOKYO METROPOLITAN AIR POLLUTION EMERGENCIES. (SULFUR OXIDES). *(Tokyo-to taiki osen kinkyuji taisaku jisshi yoko (io sankabutsu)). Text in Japanese. 52p., 1972.*

Measuring stations for air quality standards, measuring methods, emergency warning issues and releases, standards for emergency and releases, countermeasure operations, lists of government agencies and offices of local governments, of health centers, of professional organizations, and of factories to be notified of emergencies, cooperating factories in case of emergencies, and air pollution control law enforcement regulations are presented. A sulfur oxides warning is issued whan a concentration of 0.2 ppm has continued for more than 3 hours, or when 0.3 ppm has continued for more than 2 hours, or when the average sulfur oxides index of 48 hours has reached 15 ppm, or when the concentration rises above 0.5 ppm and is expected to stay at that level from the standpoint of weather. The situation will be made known to ghe general public; emission sources will be requested to cooperate in reduction, smoke cooperating industries will be advised to reduce emissions by 30% The SOx alarm is issued when concentration reaches 0.5 ppm during SOx warning. In addition to notifying the general public, cooperating factories will be advised to reduce smoke emission by 70%. A SOx emergency warning is issued when 0.5 ppm concentration has continued for 3 hours, or when 0.7 ppm has continued for 2 hours. Cooperating factories that emit more than 10 N cu m/hr smoke will be requested to reduce more than 80% of their normal smoke emissions.

26217 **APTIC NO. 47402**

Boisseree, Klaus

WARNING AGAINST AN AMPUTATION. *Text in German. Umwelt. (Duesseldorf), 2(6):46-47, 1972.*

The draft of the Federal Emission Protection Law, which could not be ratified because of the premature dismissal of the Bundestag, shall now be shortened by omitting the regulations concerning the authorization of emission promoting plants. The regulations shall remain with industrial legislation. The emission protection law shall only point to the pertinent sections of the industrial legislation. Since the industrial legislation is up to state or local authorities it is strongly advised to have the respective regulations omitted from the industrial legislation and included in the Federal Emission Protection Law for effective and uniform execution of the regulations.

26218 **APTIC NO. 47333**

Borresen, Hakon

CONSIDERATIONS BY THE AIR POLLUTION COMMISSION. A REGULATION FOR THE ABATEMENT OF AIR POLLUTION. *(Innstillingen fra Luftforurensningsutvalget. En lov om vern mot luftforurensning). Text in Norwegian. Tek. Ukeblad (Oslo), 110(42):31-35, Oct. 1972.*

General considerations regarding air pollution control policy and legislation in Norway are presented. Legislative measures should ensure the prevention of air pollution to the maximum possible extent on the principle that no person has the right to inflict damage and nuisances to others. General minimum requirements concerning emission control should be fixed in acts, while enforcement of these acts should be ensured by administrative regulations. The costs involved in pollution control measures should be passed on to the customers who thus would have to pay the real price of commodities and services rendered.

26219 **APTIC NO. 47430**

Fri, Robert W.

NATIONAL AMBIENT AIR QUALITY STANDARDS. *Federal Register, 37(185):19806-19815, Sept. 22, 1972.*

Pursuant to the Clean Air Act, regulations for Hawaii, Iowa, Kansas, Minnesota, Rhode Island, Vermont, and Wyoming are given which correct deficiencies in the regulatory provisions of the implementation plans for national ambient air quality standards as specified in Part 52 of Title 40 of the Code of Federal Regulations. Procedures are given for reporting and recordkeeping by source owners and for public disclosure of emission data, compliance schedules, and enforcement and review procedures for construction of new sources or modifications of existing sources.

26220 **APTIC NO. 47380**

Humphreys, Vic

INDUSTRY GUIDE FOR CONTENDING WITH POLLUTION CONTROL STANDARDS. *Oilweek (Calgary, Can.), 23(29):16-17, 19, 22, Sept. 4, 1972.*

Various Federal and provincial governments in Canada have established environmental departments, regulations, and legislation. Air quality standards have been established for fluorides, hydrogen fluoride, oxidants (as ozone), nitrogen oxides (as nitrogen dioxide), carbon monoxide, ammonia, lead, hydrogen sulfide, sulfur dioxide, dust fall, suspended particulates, and soiling. Emission standards have been formulated for the pulp and paper industry, petroleum refineries, oil and gas production, and many other industries. Water quality standards and noise regulations have also been established.

26221 **APTIC NO. 47644**

Terabe, M.

PRESENT STATUS AND CONTROL OF AIR POLLUTIONS IN KAWASAKI. *(Kawasaki-shi no taiki osen no genjo to kongo no taisaku). Text in Japanese. Kuki Seijo (Clean Air J. Japan Air Cleaning Assoc., Tokyo), 10(5):66-71, Oct. 1972.*

With the decrease in the use of coal, there has been a conspicuous increase in the use of oil with less sulfur content. Emission of sulfur dioxide leveled off in 1965-70, but decreased slightly in 1971. High stacks, dispersion, and the enactment of the Anti-Air-Pollution Law, have decreased concentration of SO2 since 1968-69. After 1971, the decrease was due to the use of low sulfur content fuel. Plants are urged to switch to low sulfur oil when the SO2 concentration reaches 0.2 ppm for two hours. The number of warnings issued decreased from 29 in 1969, 19 times in 1970, to 8 times in 1971. Urgent measures due to photochemical smog were taken 11 times in 1971. The lead concentration in the atmosphere ranged 0.92-3.07 micrograms/cu m. There were 1002 patients with pollution-related diseases as of May 1972. More stringent environmental air quality and emission standards are being considered by Kawasaki City. Centralized monitoring of SO2 will be completed in Aug. 1972.

26222 **APTIC NO. 47475**

Venezia, Ronald A.

THE IMPLICATIONS FOR TRANSPORTATION OF NEW FEDERAL AIR POLLUTION CONTROLS. *Preprint, Highway Research Board, 26p., 1972. 8 refs. (Presented at the Highway Research Board, Summer Meeting, 5th, Madison, Wis., July 31-Aug. 2, 1972.)*

A concise legislative history of Federal air pollution control efforts terminating with the Clean Air Amendments of 1970 is given. Although implications of compliance with Federal ambient air quality standards include the need in numerous urban areas for transportation controls, most of the State implementation plans submitted to the Environmental Protection Agency by Jan. 1972 did not include such controls. Roll-back methodology used in predicting the future air quality attendant to projected emission reductions is discussed. Mobile and stationary source emissions for carbon monoxide, hydrocarbons, and nitrogen oxides are discussed. Implementation plans are discussed with regard to control techniques, socio-economic factors, administration, and systems analysis. State air quality control regions are listed with justifications for extending the deadline for establishing carbon monoxide and photochemical oxidant primary standards.

26223 **APTIC NO. 47501**

Venezia, Ronald A.

THE LAND USE AND TRANSPORTATION IMPACT ON AIR QUALITY. *Preprint, 18p., 1972. 15 refs. (Presented at the Interagency Conference on Environment, Livermore, Calif., Oct. 17-19, 1972.)*

In terms of transportation legislation, there has been a growing concern that the planning process itself be truly continuing, comprehensive, and coordinated and that environmental objectives, including air pollution abatement, be given due consideration. The necessity to provide a viable alternative to the automobile through acceptable mass transportation is gaining emphasis in policy objectives and in financial commitment. The Clean Air Amendements of 1970, state implementation plans, emissions standards, and air quality goals, as they pertain to transportation, are reviewed. Transportation controls, as of February 1972, are listed for the various states according to whether they are being considered, have been proposed, or have been adopted. Land use controls are also discussed, in addition to planning for air quality. Attempts at air quality modeling are mentioned, and the Argonne National Laboratory land-use computer submodule is described.

26224 **APTIC NO. 47594**

Weidner, Edward W.

EDUCATIONAL ASPECTS OF ENVIRONMENTAL ISSUES. *Int. J. Environ. Studies, vol. 2:301-308, 1972. 8 refs.*

Global problems of the environment have human as well as technical dimensions. Solution of these problems will require substantial commitment by higher education. Colleges and universities will be called upon to produce graduates with new skills--all the way from skills of awareness and commitment to job related skills of a generalized and specialized nature. The role of higher education in providing education and training in such new skills has many dimensions: structure, methods, theory, scope, and institutional form. In addition, there are important implications for governments and opportunities for international cooperation in this new area. Industrial and developing nations alike need to heed the warning signs of an ever-deteriorating environment and provide education which will facilitate the development of a world citizenry equipped to negate the faculty decisions of the past while providing for a better future. Some of the alternatives from which institutions and systems of education can choose in order to provide adequately for environmental education are considered. (Author abstract modified)

26225 **APTIC NO. 47373**

Wilson, Richard

TAX THE INTEGRATED POLLUTION EXPOSURE. *Science, 178(4057):182- 183, Oct. 13, 1972. 11 refs.*

The President has proposed a tax based on the amount of sulfur dioxide emitted from smokestacks and power stations. An alternative method of taxation is suggested which would spread the tax burden among polluters in proportion to their impact on health. This would be based on the product of the concentration of the pollutant and the population at risk. The principle is applied to radiation exposure, sulfur dioxide from domestic oil heaters, and oxides of nitrogen. (Author abstract modified)

1971

26226 **APTIC NO. 47812**

Hohenheim Univ. (West Germany), Informations- und Pressestelle

ACTIVITIES OF THE HOHENHEIM UNIVERSITY IN ENVIRONMENTAL RESEARCH AREA. *(Aktivitaeten der Universitaet Hohenheim auf dem Gebiete der Umweltforschung). Text in German. Umweltforschung, no. 58:92-103, 1971. (Presented at the Hohenheim University Umweltforschung Seminar, 1971.)*

A synopsis is given of the activities of Hohenheim University in the environmental research area. Studies in the field of pollutant emissions are concerned with problems such as the biological and ecological determination of emission damage zones; the effects of fluorine on pollen, fruit growth, and germination; the determination of selenium in plants and of arsenic, lead and fluorine in the soil; suitability tests of atomic absorption spectrometry for the analysis of lead, cadmium, iron, copper and zinc; the possibilities ot abate emissions in livestock farming; the anthropogenic radioactivity in air; precipitation and dust; monitoring of strontium-90 concentrations; electric charge distribution in aerosol particles; disturbances in the equilibrium of aerosol-borne radon and thoron daughters; the adhesion of aerosol particles on plant surfaces; aerosol separation by soil capillaries, light scattering by dielectric spherical particles, and the effect of humidity on aerosol particle size distribution. Studies on the lead retention by the skeletal system and on the initial stage of fluorosis are being planned.

26227 **APTIC NO. 47810**

Buchholz, Ernst Wolfgang

SOCIOLOGY, SPACE MANAGEMENT AND PLANNING. *(Soziologie - Raumordnung und Landesplanung). Text in German. Umweltforschung, no. 58:78-80, 1971. (Presented at the Hohenheim University Umweltforschung Seminar, 1971.)*

General problems of space management and space planning are outlined. Space planning should limit the exploitation of natural resources and capacities to the necessary extent, and call for regeneration of such resources and capacities whenever possible. Green belts and recreational areas should be created or spared in urban and industrial areas. While social control, in direct confrontation with careless polluters, may be sufficient for the prevention of more damage, overall improvement of the environment can be brought about only through regulations and measures taken at highest levels.

26228 **APTIC NO. 47688**

Grubb, Hugh P.

ORGANIZING AND PLANNING A POLLUTION CONTROL DEPARTMENT. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 21, p. 21-3 to p. 21-14. 6 refs.*

Three basic considerations are necessary to an air pollution control program: the air pollution saturation potential, be it liquid, solid, or gaseous, of the industrial evnironments; the industrial area characteristics which are subject to the causes and effects (chemical or photochemical changes) of the pollutant and its economic impact; the capacity of the industry to generate air pollutants in terms of types, emission rates, and atmospheric reactions. The methodology for achieving these objectives requires that the management organizes the activities into a system, examines the data, alters the activities where required, and develops a feedback loop; performs an aggressive empirical study of all pollutants, their sources and behavior, in a systems framework to portray clearly the criteria for adequate pollution control technology and management; and develops program objectives, expressed in quantifiable terms, to measure accomplishment and aid the decision making process in the presentation of the objectives. Management functions and responsibilities are listed. Training programs, control methodology, and control costs are discussed.

26229 **APTIC NO. 47669**

Kinney, John E.

THE INDUSTRIAL POLLUTION PROBLEM. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw- Hill, 1971, Chapt. 1, p. 1-3 to 1-19.*

Rather than be directed toward solution of problems selected on basis of priority of importance, grant monies are an inducement for ideas of any kind on any facet of individual interest. The development of the present situation is traced as a basis for recommending decisions that are prerequisite to a sound program. Legislative activity is reviewed, including criteria and standards, economic considerations, tax relief, and research grant programs. Analytical considerations and administrative mechanics are also discussed. Partial responsibility for lack of knowledge on actual effects of waste discharges, for both air and water, can be assigned to present data collection philosophy. In too many instances the analytical techniques were devised to measure constituents rather than the single or combined effect of several constituents. A relationship was then assumed between the constituent measured and an observed effect. After a while the assumption is forgotten and the specific analysis becomes the control.

26230 **APTIC NO. 47785**

Laet, Christian de

ADMINISTRATION OF NATURAL RESOURCES IN CANADA. *Provincia de Buenos Aires (Argentina), Comision de Investigaciones Cientificas, Reunion Probl. Efluentes Ind. Contam. Ambiental, La Plata, Argentina, 1971, p. 83-93. (July 12-17.)*

Physical barriers and geological aspects of Canada are mentioned, in addition to the British and French approach to environmental control. With regard to environmental problems, it is much more useful to use the British approach which is more responsive to problems than the French approach, which always is better when it has stipulated every single fact. The governmental and administrative approach to environmental quality and Canada s concern for its natural resources are discussed. It is much more efficient to look at the problems at their source and to invest in pollution control at the educational level. Responsibility for pollution control is considered.

26231 **APTIC NO. 47685**

Reeve, David H. and Joseph Scruggs

PLANT OPERATION AND TRAINING PERSONNEL FOR POLLUTION CONTROL. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 22, p. 22-1 to 22-23.*

The effect of poor equipment operation in pollution control work is generally more detrimental to efficiency than poor operation of other process control equipment. Therefore, training personnel to operate the equipment properly becomes a very important part of selecting, installing, and operating control equipment. Specific control points which operators are required to know to maintain continuous, trouble-free operation of the control equipment are summarized for bag dust collectors, cyclones, electrostatic precipitators, wet scrubbers, entrainment removal apparatus, settling ponds, and combinations of pollution control circuits. Costs of pollution abatement are considered. The emphasis in supervisor training needs to be stressed in downtime analysis, preventive maintenance, analysis of operating efficiency, and integrated system control. Subjects which should be discussed during a training course are outlined, as well as a specific training program. How to set up a training manual is indicated, as well as how to train subordinates and equipment operators.

26232 **APTIC NO. 47811**

Roehm, Helmut

ENVIRONMENTAL CHANGES AS GENERATED BY AGRICULTURAL PROGRAMS. *(Umweltveraendernde Auswirkungen agrarpolitischer Programme). Text in German. Umweltforschung, no. 58:81-87, 1971. (Presented at the Hohenheim University Umweltforschung Seminar, 1971.)*

Environmental aspects of agricultural policy and agricultural programs are outlined with special regard to those implemented in Baden Wuerttemberg. The agricultural and forestry use of spaces to be rehabilitated should be preferred to passive rehabilitation which implies abandonment of agriculturally used or potentially usable areas. The decentralization of industries should be avoided, and fertile agricultural areas should be especially sheltered from industrial and urban expansion. Sufficient expanses 4of land near urban agglomerations should be reserved for agricultural and recreational use.

26233 **APTIC NO. 47803**

Schreiber, Karl-Friedrich

SITE, VEGETATION AND LANDSCAPE. *(Standort, Vegetation und Landschaft). Text in German. Umweltforschung, no. 58:15-17, 1971. (Presented at the Hohenheim University Umweltforschung Seminar, 1971.)*

General problems of space planning are outlined with special regard to the use and function of different types of vegetation. Model studies of various site factors and load capacities of subsytems ar necessary. Natural potentials should be surveyed to exclude sites with high natural production capacity from industrial and residential development projects. Contrary to the prevailing assumption that forests constitute a panacea for environmental problems, are observations according to which farm cultures are able to assume the role of and are sometimes even superior to forests. Land use-related decisions should be made specifically with respect to the functions the different types of vegetation in specific sites will have to assume (e.g., dust filtration, dilution of waste gases, and recreation).

26234 **APTIC NO. 47679**

Watson, Kenneth S.

THE COORDINATED INDUSTRIAL-MUNICIPAL-REGIONAL APPROACH TO AIR AND WATER POLLUTION CONTROL. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 8, p. 8-1 to 8-3, 8-24 to 8-28.*

There are fewer examples of the regional approach to air pollution control than water pollution control, because the former field is newer. The formation of localized pollution control programs is necessitated by the fact that the most effective work can be done in a geographic area affected by the same or common sources of pollution. In air pollution control the regional approach covers the legislative, administrative, and supervisory mechanism under which a program is carried out. The Air Quality Act of 1967 recognizes the significance of the regional approach by specifying that the Federal program will encourage cooperative activities by the states and local governments as well as the formation of interstate compacts. Further conditions of the Act which encourage the regional approach are mentioned, as well as Federal grants and national sampling efforts. Interstate programs are considered, including the Interstate Sanitation Commission, the Mid-Atlantic states air pollution control compact, and compacts between Illinois and Indiana, and Ohio and West Virginia. The Los Angeles County program of air pollution control is cited. However, states will continue to exercise an important role in pollution control. At present, 14 states have implemented their authority to control air pollution by adopting air quality or emission standards.

26235 **APTIC NO. 47671**

Wilkenfeld, Jerome

HISTORY OF STATE AND LOCAL POLLUTION LAWS. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 3, p. 3-1 to 3-17.*

It is probable that the rate of passage of pollution legislation will taper off and that in the future legislative changes will occur at a slower rate so that in the overall a plot of frequency of legislative change versus time will follow a Gaussian distribution. Characteristics of early local regulations are cited, as well as instances of pollution and its control in the Medieval, Victorian, and Modern ages. Current ordinances and the interpretation of legislation concerning water pollution are mentioned. With regard to air pollution control, early local legislation is indicated, as well as New Jersey and the New York State control acts. Evolution of the Los Angeles air pollution control program and San Francisco Bay Area regulations are discussed. Some areas are attempting to base control regulations more directly on ambient air quality requirements at the point of use; the alternative is to adopt emission limitations based on what is technologically feasible without consideration of actual need. A tabulation of typical state ambient air quality standards gives some idea of the variation resulting from differing needs. Stack emissions control in South Carolina, methods for determining compliance in Texas, and ambient air and emissions control in New York are considered. One problem which receives frequent discussion in industry is the question of equality versus equity arising in the enforcement of rules. Priorities for control, local community function, impact of the Federal Air Quality Act on state and local control, education of industrial management, and predictions for future regulations are mentioned.

26236 **APTIC NO. 47678**

Zuzik, Joseph B.

RESEARCH PROGRAMS FOR AIR AND WATER POLLUTION CONTROL. *In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 9, p. 9-1 to 9-12, 9-14 to 9-16. 4 refs.*

Causes of air pollution and its nature are considered, as well as legislation, problem areas, research and development activities, problem evaluations, control methods, and air pollution monitoring. Vehicle emission control by a catalytic method is included. The Reinluft process, catalytic oxidation, dolomite injection, alkalized alumina, and other processes for the control of sulfur dioxide emissions are listed. The removal of chlorine from a gas stream and particulate removal are considered. There is a definite need for a coordinated effort by federal, state, and local governments in conjunction with and with the support of industry to combine the many disciplines that play a vital role in seeking out the right answers to the so many perplexing questions concerned with industrial pollution. Development of a strong centralized program is necessary. Organizations supporting research and funding reported for 1966 are classified. Wastes from the manufacturer and use of synthetic chemicals are also considered.

1970

26237 **APTIC NO. 47789**

Public Health Service, National Air Pollution Control Administration

REPORT FOR CONSULTATION ON THE CHAMPLAIN VALLEY INTERSTATE AIR QUALITY CONTROL REGION (VERMONT-NEW YORK). *Rept. APTD-1099, 47p., March 1970.*

NTIS: PB 209786

The Clean Air Act stipulates that the designation of an air quality control region shall be preceded by consultation with appropriate state and local authorities, and this report is intended to provide background material for the consultation pertaining to the Champlain Valley Interstate (Vermont-New York) Air Quality Control Region. The factors which are the basis of the boundary proposed are discussed. Regional geographic and topographic characteristics, population patterns, economic factors, and governmental activities are presented, as well as technical factors related to regional air pollution. Highways, recreational activities such as skiing and their projected growth, and an emissions inventory are included. The regional approach to air pollution control is discussed, in general.

26238 **APTIC NO. 47554**

Schneiderman, Michael, Cal K. Cohn, and Glenn Paulson

AIR POLLUTION AND URBAN FREEWAYS: MAKING A RECORD ON HAZARDS TO HEALTH AND PROPERTY. *Cath. Univ. Law Rev., 20(1):5-18, Fall 1970. 67 refs.*

Health effects of highway air pollution and typical concentrations are considered. Highway planners should have a complete record of the air pollution effects of a proposed road. In addition, they should be told what to do with the information. Reasonably sound measurements can be made of the amounts of pollutants produced by each automobile. Traffic estimates, required to be made by state highway departments seeking federal approval, can then be used to estimate total pollution on the highway. Forecasts of altered traffic patterns can be used to estimate the total increase or decrease in pollution burden for the entire city, or broad regions within it. Mathematical tools, based on observations of the dispersion of pollutants from sources such as freeways, can be used to estimate pollution concentrations at any distance from the road. The latest medical research can be consulted to determine the effects on human health of concentrations estimated in this way. The Federal High was Administration s regulations are cited, and the limited collection of data for hearings on the proposed Lower Manhattan Expressway in New York City is considered.

SOCIAL ASPECTS

1972

26239 **APTIC NO. 47432**

Davis, Arthur A.

TRANSPORTATION--SHAPER OF CITIES. *Nat. Tuberc. Respirat. Dis. Assoc., Bull., 58(5):5-9, June 1972.*

Transportation shapes our cities--determines where they are located, what they look like, where their people will live, and, in considerable measure, how well they will live there. The move of people from the cities to suburban areas and the replacement of public transportation by the private automobile are mentioned. The need for area-wide metropolitan planning processes that relate and balance functional transportation plans with those for community facilities, open space, housing, and other major inputs, services, and systems that form the metropolitan complex, is discussed.

GENERAL

1972

26240 **APTIC NO. 47383**

Roberts, D. G. M.

PUBLIC HEALTH ENGINEERING IN THE EXTERNAL ENVIRONMENT: WATER SUPPLY AND RE-USE, WASTE DISPOSAL AND POLLUTION CONTROL. *Phil. Trans. Roy. Soc. Lond., Ser. A., 272(1229):639-650, July 1972.*

Public health engineering controls the construction and operation of works to control air and water pollution and solid, liquid, and gaseous waste disposal. Internal and external environments are dependent on one another; for example, domestic fireplaces cause the greatest urban air pollution. The Clean Air Act, central heating, and smokeless fuels have reduced this pollution and increased the hours of winter sunshine by 75% over the last 20 years. Power-station ash, industrial wastes, and domestic garbage are disposed of by incineration, composting, landfill, and reclamation of useable wastes. High stacks have reduced sulfur dioxide pollution. The effects of car exhausts, carbon dioxide from combustion, dust, and aerosols are being studied.

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26241 **APTIC NO. 47471**

Ruckelshaus, William D.

NEW HORIZONS IN LAND PLANNING. *Preprint, California League of Cities, 10p., 1972. (Presented at the California League of Cities, Anaheim, Calif., Oct. 16, 1972.)*

Many states are regulating growth and land use. Several court rulings have upheld a state's right to limit and plan growth. Because of the diminishing land resources, the use of the remaining land is an important question. Federal legislation has been proposed which would provide $100 million during the next 5 years to help the states assume land use planning and regulatory authority over the most critical and diminishing land assets.

26242 **APTIC NO. 47632**

Suzuki, T.

RANDOM THOUGHTS ON AIR POLLUTION. *(Taiki osen zuiso). Text in Japanese. Kiki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 10(5):76-81, Oct. 1972.*

Air pollution now attracts more public interest and concern than ever before. Soot, sulfur dioxide, and photochemical oxidants are the major pollutants. Exhausts from automobiles produce carbon monoxide, nitrogen oxides, and hydrocarbons, as well as other pollutants. Telemeterized and computerized monitoring networks are widely used in Japan, but the maintenance of equipment and evaluations of results are often poor. Unless the planning and execution of the monitoring program are correct and the personnel adequately trained, the actual air pollution situation cannot be determined. Continuous monitoring is used for issuing warnings only. The effect of complex pollution situations can only be determined by specialists. A global approach is necessary to solve the complex problem of pollution. Carbon monoxide and particles smaller than 1 micron in diameter must be studied further.

1971

26243 **APTIC NO. 47802**

Kreeb, Karlheinz

ECOLOGICAL PRINCIPLES. *(Oekologische Grundlagen). Text in German. Umweltforschung, no. 58:9-12, 1971. (Presented at the Hohenheim University, Umweltforschung Seminar, 1971.)*

Principal features of the ecological system are outlined with special regard to the ecological effects of athropogenic factors. Ecological systems are characterized by permanent production and metabolism of substance, by permanent material and energy cycle, and by dynamic equilibrium despite intense metabolism. Parts of the ecological system are always subordinate to the system as a whole. Human activity, such as through industrialization, may cause disturbances and irreparable damages to the ecological system e.g., in the form of soil erosion, changes in the vegetation and changes in soil quality.

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